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Public recreation and landscape protection – with man hand in hand...

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AESTHETIC VALUE OF NATURE - PLEASURE OR APPRECIATION?

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Abstract
The paper discusses the aesthetic dimension of landscape. In the Czech Republic, landscape character is protected by law from activities that would diminish its aesthetic and natural value. Most landscape experts agree that areas with well preserved landscape character should be protected for the sake of visitors and future generations, because of their aesthetic value. However, to define aesthetic value in such a way that it would be able to compete with other interests is often perceived as a difficult task – mostly because aesthetic value tends to be understood as purely sensory-based. This is the way of understanding aesthetic value that dominates methodologies for landscape character assessment. Looking from the point of view of aesthetics, though, we find many inconsistencies. While methodologies view aesthetic value as a result of sensory perception, aesthetics view it as a conscious reflected act. The paper poses a question: to what extent is it desirable to view aesthetic value as a pure result of like or dislike, in other words as a result of a pleasant or unpleasant feeling from perceiving landscape, and could a different approach lead to aesthetic value being assigned more argumentative weight?

Keywords: landscape character, methodology for landscape character assessment, aesthetic value, aesthetic appreciation, pleasure

INTRODUCTION

When we look at the discourse on how to protect certain natural areas and preserve their aesthetic values, we can notice there is a gap – one that is not often discussed – between aesthetic theory and practice, in other words between the knowledge attained by aesthetics as a discipline and the actual approach to aesthetic aspects in practical landscape protection. In practice, aesthetic appreciation mostly tends to be misunderstood simply as a sensory or recreational pleasure – aesthetic appreciation is thus mistakenly confused with the desire for enjoyment, and the whole appreciation process gets reduced to a way of consumption. In the end, aesthetic experience loses its specificity, relevance and meaning.

Though this is not a problem limited to protection efforts in the Czech Republic, we believe we can fittingly illustrate it on the case of Czech protection of landscape character and the methodology of its assessment. Methodological guidelines, notably, abound with uninformed or intuitive use of aesthetic dimension, most strikingly the term *aesthetic value*.

Czech law defines landscape character as *"especially the natural, cultural, and historic characteristics of a certain place or area; **it is protected from activity that would degrade its aesthetic and natural value.**"*[1] The tools that are supposed to ensure that the protection set by law gets realised are the methodologies of landscape character assessment.

RESERCH AND RESULTS

Aesthetic Value as Represented in Methodologies

Based on a critical analysis of methodologies and texts written by Löw and Míchal (1999)[2], Löw and Kučera (1996)[3], Löw and Míchal (2003)[4], Vorel et al (2004, 2006)[5], Bukáček and Matějka

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1 Act no. 114/1992 Coll. on nature and landscape protection

2 Míchal, I.: *Metodika hodnocení krajinného rázu Agentury ochrany přírody a krajiny ČR – Problémy a výsledky* [Landscape Character Assessment Methodology of the Czech Agency for Nature and Landscape Protection], in: Vorel, I., Sklenička, P. (eds.): *Péče o krajinný ráz – cíle a metody* [Landscape Character Care – Goals and Methodologies]. Praha: ČVUT.

3 Löw J., Kučera, P.: *Metodika pro hodnocení zastavitelnosti území [Methodology for Assessing Suitability of Land for Building]*. Brno: Löw a spol. – Ekologická dílna Brno, 1996.

4 Löw, J. Míchal, I.: *Krajinný ráz* [Landscape Character]. Brno: Lesnická práce, 2003.

5 Vorel, I., Bukáček, R., Matějka, P., Culek, M., Sklenička, P.: Metodický postup posouzení vlivu navrhované stavby, činnosti nebo změny využití území na krajinný ráz [Methodological Guidelines for Assessing the Impact of Planned Buildings, Activities or Changes in Land Use on Landscape Character]. Praha: ČVUT, 2004, 2006; Vorel, I. *Hranice únosnosti zásahů do krajinného rázu* [Limits of

(1997, 1999, 2006)[6] and Kupka et al (2010) [7], we can demostrate the way the authors approach aesthetic dimension on the following statements. Míchal and Löw[8] state: *"Here, we can no longer use intuitive aesthetic assessment; it is a result of holistic appreciation of landscape, but it is neither supported by rational analysis, nor does it arise from thinking in words expressed as terminology – it leads just to a generalised aesthetic judgment that says 'I do/don't like it'."* In their methodology, Bukáček and Matějka understand landscape character as a *"collection of specific characteristics of landscape which are the causes of its functional, visual and emotional effects, and which thus make it unique."*[9] Vorel also writes that landscape character is expressed through sensory (most often visual, he says) application of features and phenomena of individual characteristics of landscape scenery. The aesthetic value of landscape then manifests in the viewer's sensations. *"These sensations reflect the so-called emotional values of the landscape and evoke certain psychical feelings, such as relaxation and composure, or, on the contrary, anxiety, surprise, awe."*

The following are examples of phrases used in the above-mentioned works to describe aesthetic value and its formation: *"visual and sensory effect", "intuitive aesthetic assessment", "aesthetic value of landscape manifests in the viewer's sensations", "aesthetic sensations causing pleasant feelings," "the emotional value of landscape", "sensorially (mostly visually) comprehensible characteristics of certain place", "visual appeal of landscape scenery".* In summary, the authors believe that aesthetic value is formed by projecting all typical features and combining them into positive/negative values that the evaluating subject can "read" from the sensorially (mostly visually) comprehensible characteristics of certain place.

The Definition Board of the Ministry of Environment, trying to unify inconsistent methodologies, published a statement that says: "the law (…) protects exclusively the aesthetic and harmonic aspects of landscape, perceivable and evaluable solely through senses, especially sight (…)"[10]. This claim basically says that one evaluates through his senses.

DISCUSION

The Hedonistic Model of Appreciation

Emily Brady[11] speaks about the so-called **hedonistic model of aesthetic appreciation.** It is based on the faulty presumption that the desire for pleasure or gratification is what drives people to aesthetic appreciation – that people seek out certain landscapes because they cause joy or evoke pleasant feelings – and that aesthetic judgment is a matter of individual taste. Things do not have aesthetic value just by themselves, she argues. The result of such a process is then a pleasant/unpleasant feeling or an exclamation: "I like it/I don't like it."

People are constantly stressed or busy, the considerably diminishing quality of urban environment does not offer much relief, and one tends to seek recreation. The enjoyment of one recreational activity may interfere with the enjoyment of other recreational activities – which is evident in the way many natural areas are managed. How can we weight the importance of different competing demands? Should we try to please all of them? This all because of a purely utilitarian question based on the conventional economic model – will as may different people

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Acceptability of Interventions to Landscape]. In: Ochrana krajinného rázu - třináct let zkušeností, úspěchů i omylů. Ed. I. Vorel, P. Sklenička. Praha 2006;

[6] Bukáček, R., Matějka, P.: *Hodnocení krajinného rázu* [Landscape Character Assessment], in: Vorel. I., Sklenička, P. (ed.): *Péče o krajinný ráz – cíle a metody* [Landscape Character Care – Goals and Methogologies]. Praha: ČVUT, 1999.

[7] Kupka J., Vojar, J., Vorel, I.: *Intersubject agreement in evaluating the visual attractiveness of landscape*, in: *Journal of Landscape Studies,* 4/2010.

[8] Löw, J. Míchal, I.: *Krajinný ráz* [Landscape Character]. Brno: Lesnická práce, 2003, p. 75.

[9] Bukáček, R., Matějka, P.: *Hodnocení krajinného rázu* [Landscape Character Assessment], in: Vorel. I., Sklenička, P. (ed.): *Péče o krajinný ráz – cíle a metody* [Landscape Character Care – Goals and Methogologies]. Praha: ČVUT, 1999. Bukáček, R., Matějka, P.: *Hodnocení krajinného rázu v CHKO ČR – návrh metody* [Landscape Character Assessment in Czech Protected Landscape Areas – Methodology Proposal], in: *Ochrana přírody,* vol. 3/1997.

[10] Cibulka, J.: *Vymezení podrobností ochrany krajinného rázu* [Delineating the Details of Landscape Character Protection], in: Vorel. I., Sklenička, P. (ed.): *Ochrana krajinného rázu – třináct let zkušeností, úspěchů i omylů*. [Landscape Character Protection – Thirteen Years of Experience, Successes and Mistakes] Praha: ČVUT, 2006, p. 58.

[11] Brady, E.: *Don't Eat the Daisies. Disinterestedness and the Situated Aesthetics*, in: Environmental Values, 7/1998, pp. 97-114.

enjoy a given parcel of land if it is declared wilderness as would use it if it were developed with an access to sanitary facilities and picnic tables? [12]

The danger of hedonistic approach to landscape appreciation – an approach that we often meet in the field of landscape protection – is that it prevents us from finding the true value of a place, because we measure value just in terms of pleasure. If we were then expected to judge, we would of course choose a solution that would maximise the pleasure for local inhabitants or visitors. The aesthetic dimension has a weak persuasive power and becomes secondary to other, seemingly objective interests – such as the protection of endangered species or the economic benefit of highways.[13]

Aesthetic Appreciation as a Process of Value Formation

The formation or formulation of an aesthetic value is very demanding on the evaluator. Aesthetic pleasure, as opposed to normal pleasure or enjoyment that means just a physiological reaction, is a sophisticated experience. An aesthetic attitude is an evaluative attitude, and aesthetic evaluation (English uses mostly the term "appreciation") is a collection of reflected, fully conscious acts, during which the aesthetic value is formed. It can even be rationally analysed, as we often see in e.g. art criticism[14].

Aesthetics is often perceived as the study of beauty. The term “beauty” itself, however, has been re-evaluated back in the second half of the 20th century, and instead of it, “aesthetic attitude” has become the main term of today's aesthetics[15]. The aesthetic attitude, thanks to the factors of so-called disinterestedness or mental distance, occupies an important space next to the practical and theoretical attitudes[16]. In becoming disinterested, we set an object apart from its practical environment in the utilitarian-manipulative world (i.e. the practical attitude) so that our perception of it is less distorted – this is a neutral modification of consciousness, where our consciousness switches gear to neutral position and enables us to freely appreciate the object of our focus[17]. It is a mental openness which causes that no particular interests arise, and makes us able to see the object of our interest in broader context and approach its real and inherent value. As for visuality, the more visually pronounced an object is, the bigger distance is usually required. Aesthetic experience enables self-reflection, and reflection of the surrounding world and our relationship to it.

The main goal of aesthetic appreciation is to create an aesthetic object – which is not a physical object (i.e. a bearer or a stimulant, which is only a base for the creation of an aesthetic object, for example a sculpture or a painting) but rather a mental representation of the bearer-perceiver relationship (see Fig. 1). The aesthetic object comes to life during reception thanks to the perceiver's activities to attain the overall aesthetic value, the overall meaning and its appreciation. Secondary goals are qualitative complexes and minor aesthetic values, which serve as “building blocks” of the overall value.[18]

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12 *Environmental Psychology* by *Bell*, Paul A.;Baum, Andrew; Fisher, Jeffrey D.;Greene, Thomas C, p. 465

13 Brady, E.: *Don't Eat the Daisies: Disinteredness and the Situated Aesthetic*, in: Environmental Values 7/1998, pp. 97-114.

14 Zuska, V.: *Krajinný ráz a „lidová estetika“* [Landscape Character and “Folk Aesthetics”], v: Klvač, P. (ed.): *Člověk, krajina, krajinný ráz* [Human, Landscape, Landscape Character]. Brno: Masarykova univerzita, 2009.

15 Mukařovský, J.: *Obecná estetika* [General Aesthetics]. In: Studie z estetiky [Studies from Aesthetics]. Praha: Odeon 1966, p. 77.

16 The aesthetic attitude seems to be a counterweight to the other two attitudes which deem things valuable only if – and to what extent – they satisfy the purpose for which they are intended. For the aesthetic function, the bearer of a function is valuable by itself. Mukařovský, J.: *Obecná estetika* [General Aesthetics]. In: Studie z estetiky [Studies from Aesthetics]. Praha: Odeon 1966, p. 69.

17 Zuska. V.: *Kruté světlo, krásný stín. Estetika a film* [Cruel Light, Beautiful Shadow. Aesthetics and Film]. Praha: Filosofická fakulta, Univerzita Karlova 2010, p. 38.

18 Zuska, V.: *Estetika: úvod do současnosti tradiční disciplíny* [Aesthetics: Introduction to the Contemporary Side of a Traditional Discipline]. Praha: Triton, 2001. pp. 26-34, 70.

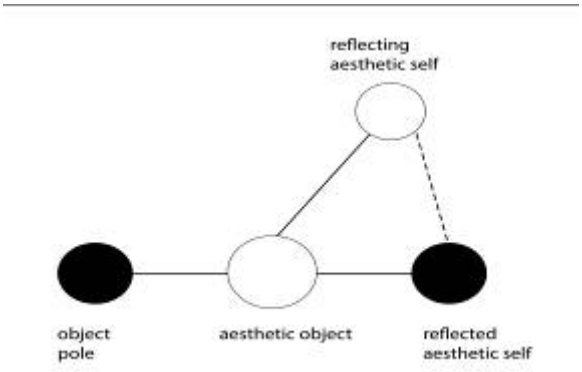

Fig. 1: We can imagine the reflecting self – aesthetic object relationship as a pendulum hanging from the reflecting self and swinging between the black points of the axis.[19]

Aesthetic value, therefore, targets higher levels of consciousness, the levels that *"are able to expose and absorb such value – i.e. to integrate it to our personality structure – or to refuse it."*[20] It is for this reason that the formation of aesthetic value will always depend on the subject's investment to aesthetic appreciation.

During aesthetic reception, the personality horizon expands. This means that from the point of view of life harmony or biologic homeostasis, aesthetic reception can be dangerous.[21]

On the other hand, aesthetic reception increases the distance from the mere vegetative dimension of life. It is not a coincidence that people who gave up their efforts of self-improvement, education, and active approach to life and others, tend to seek such bearers of aesthetic objects that, after having constituted their objects, entrench the recipients in their "time-tested" views about the world and their place in it.[22] It is no stretch to compare these situations to the consumption of trash literature – the experience of trash fiction forces the recipient to grow resigned to art, and leads to the atrophy of his ability to accumulate and extract configurations – it is unnecessary to understand the perceiver; the sense of anticipation will be provided by his genre knowledge.[23]

Objectivity vs. Subjectivity

It is no surprise that with their approach to the aesthetic dimension, the authors of methodologies soon find that it complicates the evaluation process. Kupka et al.[24] show in their determination to achieve objectivity, or e.g. on the following question: *"To what extent can legislation attribute importance to aesthetic experience that is based on sensory, especially visual appreciation? (…) A handy precautionary 'reduction' is to study visual appeal of a scenery, rather than its aesthetic value."* The authors then suggest a way how to implement this – which is to conduct a survey of aesthetic preferences of a group of people, who are asked to assign numeric values to photographs of selected landscapes. As we can see on this example, aesthetic appreciation is again confused with simple sensory experience ("appeal") or visual experience, with the added claim that it somehow becomes objective if it shared by a larger group of people. Moreover, we would like to point out that aesthetic appreciation can hardly be relevant if it based on photographs and then transformed into a numeric value. Looking at a picture, the evaluator perceives only a tiny fragment of the landscape as a whole – the landscape which is supposed to be the object of his aesthetic appreciation.

The omnipresent objectifying effort also manifest in the fact that methodologies tend to understand evaluation/appreciaton not as the formation of values, but rather as so-called "assessment" (e.g. British discourse uses the term "landscape character assessment") – seen

19 Ibid., p. 60.
20 Ibid., pp. 45-46.
21 Ibid, pp. 72-73.
22 Ibid, p 70.
23 Ibid, p. 128.
24 Kupka, J., Vojar, J., Vorel, I.: *Intersubject agreement in evaluating the visual attractiveness of landscape*, in: *Journal of Landscape Studies,* 4/2010, p. 223.

mostly just as **identification, description, and classification[25].** The authors seem to believe that values are present in landscape independently from the perceiver.
Let us demonstrate the hazards of "objective" classification on the so-called **scenery landscape model of appreciation**, the ancestry of which can be tracked back to the age of romanticism and the boom of landscape painting. This model, which is still uninformedly being used by landscape engineers, has recently been widely criticised by environmental aestheticians[26] because it focuses on mere formal qualities, and is based predominantly on art appreciation, i.e. it deals with a depiction of an object and the depicted features. As a result, **a crucial set of experience with the natural world is completely ignored,** and only a relatively limited group of aesthetic features are evaluated. The model wants us to perceive environment as a static, basically two-dimensional representation, and reduces landscape simply to a scene or a vista.

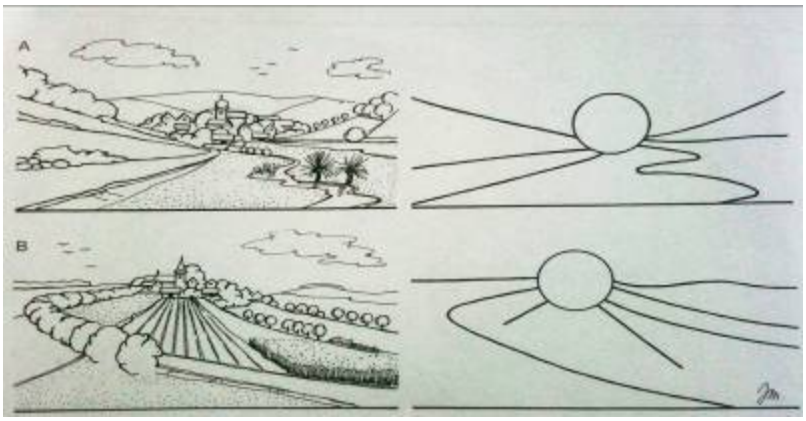

Fig. 2: An example of a common reduction of aesthetic dimension of landscape to lines and shapes.[27]

The model therefore does not reflect the real nature of the evaluated object. It limits our evaluation to visual qualities related to colour and shape. Very little aesthetic attention is given to natural objects, and the result is a vain quest for something that can only be enjoyed in art.
If we classify features in an automated way based on an antiquated concept, to what extent can this method be objective?

The Naïve and The Critical Perceiver
Let us set aside the question of objectivity and subjectivity for a while and focus on the difference between a naïve and a critical perceiver instead. A one-dimensional focus on pleasure has a lot in common with the so-called naïve, or post-modern perceiver. We have hinted at what we consider the ideal aesthetic practice above – the most common type of aesthetic reception is however very different, as can be seen on the example of an aesthetic recipient during a visit to an art gallery, where studies have shown that a typical viewer devotes mere 5 seconds of "reception" time to each painting on average[28]. Similarly, what kind of an aesthetic recipient can a tourist be, whose goal it to recognise the vista he has seen in promotional leaflets, or to get a soup in a mountain chalet?

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[25] Main aspects are the *identification* of features (natural, cultural and historic characteristics, aesthetic values of landscape, harmonic relations and dimensions) and their *classification* according to their effect (positive, neutral, negative), importance (essential, co-determining, supporting) and worthiness (unique, outstanding, common). In other words, features are deemed to exist independently from the evaluator, who just needs to describe and classify them. (Vorel, I., Bukáček, R., Matějka, P., Culek, M., Sklenička, P.: *Metodický postup posouzení vlivu navrhované stavby, činnosti nebo změny využití území na krajinný ráz* [Methodological Guidelines for Assessing the Impact of Planned Buildings, Activities or Changes in Land Use on Landscape Character]. Praha: ČVUT, 2004, 2006.)

[26] Carlson, A: Appreciation and the Natural Environment, in: Journal of Aesthetics and Art Criticism 3/1979, pp. 207-222.

[27] Mareček, J.: Krajinářská architektura venkovských sídel [Landscape architecture of a rural settlement]. Praha: Česká zemědělská univerzita v Praze 2005, p. 323.

[28] Zuska, V.: *Estetika: úvod do současnosti tradiční disciplíny* [Aesthetics: Introduction to the Contemporary Side of a Traditional Discipline]. Praha: Triton, 2001. p, 122.

When distinguishing between a naïve and a critical perceiver, the previous statements lead us to a conclusion that a naïve perceiver receives only "a fragment of a hologram, lacking all colour".[29] A layman, post-modern perceiver creates a series of larval, non-developing aesthetic objects, or does not create them at all. The process, in effect, has no conclusion, there is no final synthesis of meaning, there is no overall value – more, there is no complex value at all.[30]
Perceiver of an aesthetic object no longer lives in an unreflected flow of passive syntheses – in an utilitarian-manipulative attitude – but rather in a reflected aesthetic state of mind.[31] The act of culmination of aesthetic reception and constitution of an aesthetic object, and the act of attaining the overall aesthetic value therefore have the power to affect our everyday life in return – they affect the depth to which we appreciate relationships (structuration) and how we hierarchise values. If the regard towards the outer constituent of aesthetic object is weakened and the activity atrophies into simple like/dislike statements, the appreciative part of one's character takes the form of mere self-obsessed pleasure-seeking. If a naïve perceiver creates an aesthetic object at all, he will create a different aesthetic object which definitely is not, in the case of a work of art, adequate for the relevant artifact – he is, in other words, unable to evaluate adequately.[32]
A naïve perceiver also lacks distance – *"in self-obsession, the only important part of an experience and its outer stimulant is that which causes 'pleasant feelings', which reinforces ontological certainty and the high value that the self-obsessed personality ascribes to itself. Any distance then becomes hurtful because it could disturb the laboriously constructed projection of an ideal self."*[33] Contemporary social philosophers state that we live in a society that has a one-dimensional hedonistic relationship with future, a society with a predominant narcissistic inability to pause and focus on something else than ourselves or the object of our immediate need and consumption.[34]

CONCLUSION

In the analysed bibliographical sources on landscape character and its assessment, we can observe uninformed confusion of aesthetic experience for a mere sensory and recreational feeling. It is no surprise then that the authors seem to have trouble to work with such a feeling and to advocate it against other interests, and that they try to objectify the process in such a way that is neither effective nor constructive. Whether we try to discover an universal "generator" of values, or we try to increase relevance mainly via multiplying a layman's evaluation (which, by the way, evaluates something else than the object we originally intended – see the discussion on the use of photographs), the end result is always distorted.
If we want to move forwards in the protection of aesthetic values of nature and landscape character, it is necessary to cease viewing nature as something that serves our pleasure, and instead seek a model of aesthetic evaluation which would emphasise the unique role of aesthetic appreciation and the value of natural environment. A model which would also have better argumentative weight. In such a case, the presence of an immersed subject who is perceptive to the placement of an aesthetic object in context is crucial. We can already see something similar in art criticism, where the main role of a critic is not only to discover an object's values, but – chiefly – to be able to interpret values, present them, and thus enable others to expand their mental horizon.
Studies have shown that unaccompanied information – and the constant overload of them – have no significant effect on the change of behaviour[35], the problem being that information and data by themselves are not enough for us to connect to higher levels of consciousness.

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29 Zuska. V.: *Kruté světlo, krásný stín. Estetika a film* [Cruel Light, Beautiful Shadow. Aesthetics and Film]. Praha: Filosofická fakulta, Univerzita Karlova 2010, p. 13.
30 Zuska, V.: *Estetika: úvod do současnosti tradiční disciplíny* [Aesthetics: Introduction to the Contemporary Side of a Traditional Discipline]. Praha: Triton, 2001. p. 123.
31 Zuska. V.: *Kruté světlo, krásný stín. Estetika a film* [Cruel Light, Beautiful Shadow. Aesthetics and Film]. Praha: Filosofická fakulta, Univerzita Karlova 2010, p. 13.
32 Zuska, V.: *Estetika: úvod do současnosti tradiční disciplíny* [Aesthetics: Introduction to the Contemporary Side of a Traditional Discipline]. Praha: Triton, 2001. pp. 123-125
33 Ibid., p. 125.
34 Ibid., pp. 128-129.
35 Kollumuss, A., Agyeman, J.: Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?, in: *Environmental education research* 8/2002, p. 256.

Our landscape is in an increasingly unsatisfactory state. Forms and lines often remain, but the content has long vanished. We seek being in "nature" in order to, simply put, feel fresh air and see green plants, but is this enough? Landscape is gradually becoming like trash literature, and we help to raise consumers of trash, who lose the ability to form syntheses, and whose sense of values, especially aesthetic ones, atrophies.
Yet, the mode of experiencing reality is attributed an important role in aesthetics. The aesthetic attitude towards nature is essential both by itself, and for the protection of nature. Its potential remains, unfortunately, untapped.

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BRIDGES AND FOOTBRIDGES IN THE LANDSCAPE ENVIRONMENT FOR RECREATIONAL AND TOURIST USE

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Abstract
The building of footbridges and bridges belongs to specific buildings structures where there is, besides the general requirements related to sufficient bearing capacity, a significant criterion - harmonious and aesthetical integration of the construction into the landscape. The most suitable and natural material for constructions on the tourist or cycling trails is wood, the basic product of forestry. There were quite many wooden footbridges and bridges in the distant past. Especially the bridges on forest roads were built of wood thanks to its accessibility. A survey of current bridges has shown, however, that wooden bridges were gradually pushed into the background due to steel and reinforced concrete structures.
Beam and plate girders can be used for bearing construction of bridges and footbridges. The truncated truss used to be a prevailing construction system of the wooden bridges for a bigger span owing to the limited size of natural wood. However, modern glued timber structures enable the production of the beam and plate girders and also the arch structures of any size and shape. Due to a relatively low weight, architectural advantages and possibilities of effective timber protection, it is possible to design bridges and footbridges that comply with the current requirements.

Key words: Cycling trail, hiking trail, timber construction

Introduction

For places where a hiking trail or a biking trail is interrupted by a barrier e.g. by ravines, watercourses, valleys, swamps or highways or other busy roads, it is suitable to design bridges or footbridges. Bridges are designed for places with important bridging of purpose-built roads e.g. when a bridge is a part of a forest transportation network or country roads. Where usage of vehicles is not needed, it is possible to design footbridges, i.e. on biking and hiking trails.
The purpose of such constructions is to make the stay of a human in natural environment more pleasant with help of a technical solution. Architecturally interesting structures even enhance the aesthetic values of the landscape although we know that the highest value is embodied in the natural landscape, i.e. without intervention or with minimum human intervention. Construction of a bridge can be, despite the high requirements for construction and assembly, one of the tourist attractions on a hiking or biking trail or pathway.
According to Žák (Löw, Míchal, 2001), the structures in a harmonious landscape should be made of natural materials especially of local origin, produced in a way usual for the region and authentic to its period. The landscape values should not be sacrificed for the sake of the structures as their price lies exactly in their integrity.
In the landscape, where a greater concentration of tourists is anticipated, the structures made of natural materials should be designed not only for the aesthetic and environmental reasons, but also because they contribute to the overall psychological effect on humans. The usage of timber structures in bridge construction illustrates the potential of natural materials.

Wood and construction material

Wood is natural, environmentally friendly and renewable building material that can be recycled without problems. Wood is considered a material with a low lifespan and sometimes it is for no reason replaced by other materials. In fact, even the wood may have a high durability if in positive conditions. Timber bridge structures have a long tradition in Switzerland and are widely used especially in North America.
Wood is one of the oldest and mostly used building materials. It fits best into the natural environment for its easy accessibility and favourable qualities that are e.g. strength, easy workability, low weight and last but not least its pleasing appearance.
Wood offers a wide range of colour shades and textures. It is capable to endure even a short-term overload without adverse effects and it is not damaged by long lasting frosts or thawing. Effectiveness of wood constructions results from a light weight and a high ratio of the design strength and the weight. For example, the weight of glued timber construction at a comparable

bearing capacity is about a half when compared to steel structures and one quarter when compared to reinforced concrete structures (Havířová,1998).
For load bearing bridge-type structures mostly timber from coniferous species of strength class C24 (quality class S10) and hardwood species of strength class D30, D35 (quality class LS10) are used in compliance with norms ČSN EN 338, ČSN EN 1912+A4, ČSN 73 2824-1 and ČSN 73 1702. For main structural bearing elements of bridges and footbridges, the glued laminated timber of strength class GL 24 (or even higher strength GL28, L33) is commonly used, in compliance with norms ČSN EN ČSN EN 1194 and ČSN 73 1702. The construction can be made from solid wood only or as a combination of solid and laminated wood (especially the main beams are made from laminated wood and other segments of solid wood). In some cases a combination of wood with another building material can be used. Especially a combination of wood and concrete used in composite structures with a concrete deck can be advantageous. The combination of basic timber construction with steel elements (rods, cold-drawn rods, etc.) is relatively common (Straka, 2010).
The structures situated in the exterior exposed to ultraviolet radiation, heat, rain, snow, frost and humidity changes are affected with diverse intensity not only during the year, but also during every day. Thus inevitably, shape and volume changes occur as a result of working wood. At higher humidity the wood can be exposed to biological agents – attack of fungi and wood-destroying insects. The durability of different wood species varies considerably. Out of wood species used in the Czech Republic, it is the oak with the highest life span, which has a good resistance to higher humidity and is less attacked by both fungi and insects in the dry environment. The oak wood is, however, more expensive. Black locust (Robinia pseudoacacia) and horse-chestnut (*Aesculum hippocastanum*) are also very durable. The spruce is the mostly used wood for its minimum shape variations and sufficient durability in 3rd class of biotic pest hazard. Another suitable tree species is larch, which is more resistant to wood-destroying fungi and insects due to a higher resin content, which protects the wood. The durability of wood as an organic material is dependent on its species but it is possible to prolong it by a suitable construction protection, which lies in such a construction design that maximally limits the water penetration into the wood and provides a quick drainage. Furthermore, it is necessary to protect timber by impregnation and coating. Pressure impregnation is recommended for wooden elements designed for outdoor use. During the process, the preservative is injected deeply into the wood mass protecting wood against moisture, rot, fungi and insects.

Chemical wood preservatives must have these basic features:
a) Sufficient and long lasting effectiveness of fungicidal and insecticidal component and/or their combination, in some cases resistance to weather conditions.
b) Ability to quickly and evenly penetrate into the wood during vacuum-overpressure impregnation and/or during non-pressure application methods.
c) It must not deteriorate neither mechanical nor physical parameters of wood (its utility properties).
d) Compliance with current toxicological and ecological requirements, in particular by:
- acceptable toxicity to other organisms;
- relative harmlessness of the preserved wood for humans and environment;
- protected timber must not threaten the environment during the entire period of its service;
- possibility of safe disposal of protected timber after its service.
e) A sufficient range of applicability, e.g. possibility of applying different technologies within a wide range of temperatures, in various devices, etc. (Novotný, 2005).

Solution
In the distant past there were quite many wooden footbridges and bridges in our country. The survey of current bridges showed that a vast majority of bridge constructions is now made of steel or reinforced concrete. Often the main supporting structure is formed by I- beams of rolled sections. Bridge deck – the supporting structure of the roadway – is then formed from cross bars made of steel tubes or logs laid next to each other.
Later, reinforced concrete constructions (both monolithic but more often prefabricated) began to be used more for the bridges at tertiary roads, e.g. in a forest road network, for their better strength parameters and the supposed low wood durability. The bridge units designed for common road load were oversized and thus uneconomical.

In recent years, there has been a renaissance of wooden bridges. One of the reasons is the growing interest in the use of such a durable and environmentally sound construction material, as wood is. (Koželouh, 2007)
When designing bridges and footbridges we have to consider not only the span, load, clearance, base conditions but also the location, shape of the terrain and architectural shape. They can be designed without roofing but for life span extension it is suggested to design roofed footbridges. This is illustrated in historical footbridges, where it is clear that the wood was protected by roofing and thus not damaged by biological and climatic influences.
Although the tree diameter limits the size of the cut assortment, the introduction of glued laminated wood (glued constructions) approx. 40 years ago provided the designers with some compensation alternatives. The glued laminated timber, which is the most common modern wooden bridge material, is produced by bonding of layers of dimensioned timber by waterproof adhesives. The elements of thus bonded constructions are practically unlimited in height, width and length and can be produced in wide range of shapes. A bonded construction provides greater design strength than common timber and provides a better use of the available stock of wood by allowing the production of large wooden structural components from the smaller sections of timber. Technical progress in lamination during the last four decades further increased the suitability and technical properties of wood for modern use even in road bridges (fig.1).
Supporting structures of wooden bridges and footbridges can be made in several ways. Most wooden bridge constructions are based on proven basic systems or their combinations (fig.2), other have developed as a consequence of modern technologies in the design of wooden structures. Supporting construction depends on length of span and width of footbridge.

Fig. 1: A pressure treated glulam timber highway bridge in Austria

The minimum width of the footbridge for one pedestrian or cyclist is 0.5 to 0.7 m. A footbridge must have a one-sided railing. Should two pedestrians or cyclists be able to pass each other, then the minimum width of the footbridge must be 1.50 m and the footbridge should be equipped with a two-sided railing. If the footbridge is a part of a cycling trail, it must comply with the requirements for a passable profile for a cyclist and bicycle with no solid barriers interfering. When setting the profile, it is recommended to consider the following values (fig.3):

- Width of a bicycle 0.60 m
- Necessary cycling space 2 x 0.20 m
- Security space 2 x 0.25 m
- Clearance 2.50 m

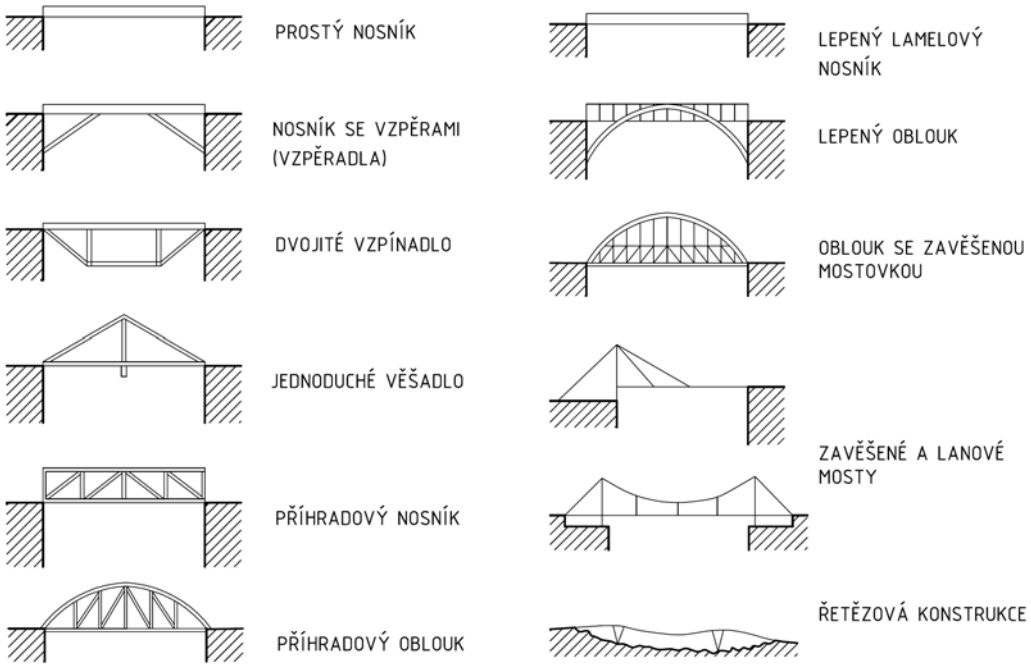

Fig. 2: Examples of construction types of wooden footbridges and bridges

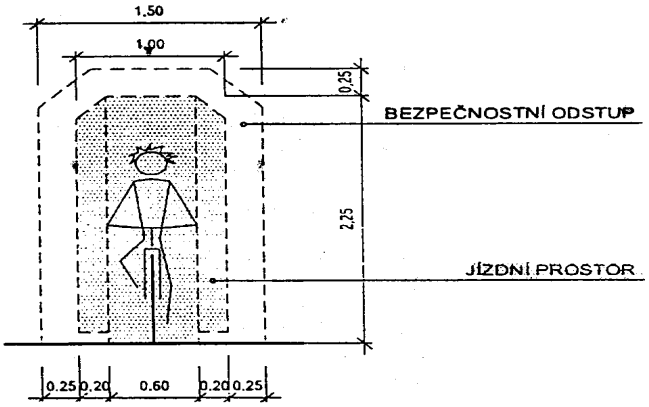

Fig. 3: Free space of a cyclist in motion (Bartoš, 2001)

When designing the width of bridges that are built for hikers and at the same time for cyclists, it is necessary to respect the following recommendations. The trails shared by cyclists and pedestrians should have a width of ≥ 3.00 m. If intensity of the traffic on the trail exceeds 18 pedestrians/hour and 150 cyclists/hour the trail extends to 4.00 m or the traffic of cyclists and pedestrians will be separated. At intensity of ≤ 50 cyclists/hour and 100 pedestrians/hour, the width of the trail can be reduced to 2.00 m, or in cramped conditions to 1.75 m.

Discussion

For footbridges and bridges situated into the landscape a simple structural systems with beam, plate or truncated truss girders are suitable. The dimensions of the girders and other supporting elements depend especially on the type and size of the load and span and the width of the bridge. The load of footbridges in comparison with the load of bridges is considerably smaller, which usually leads to leaner constructions. The quality of the timber should definitely not be underestimated. The timber for construction of wooden bridges and footbridges must be of the highest quality.

A regular check-up and maintenance of not only the construction but also the joints and fasteners is necessary as negligence of maintenance may lead to a reduced life span of

a bridge or a footbridge. A regular inspection of the whole bridge should be performed at intervals not exceeding three years.

Inspection and maintenance should be focused on:

- weathering of coatings,
- formation of cracks in the wood,
- de-lamination of laminated timber,
- mechanical damage,
- check-up of joints and fasteners,
- moisture content of timber,
- occurrence of mould and rot,
- concentration of impurities.

Summary
By introducing steel and reinforced concrete constructions, wooden bridges were gradually pushed into the background. In recent years, however, wooden bridges and footbridges used in the landscape attractive for tourists are recommended and designed again. Due to possibility of using sufficiently load bearing materials, especially glued laminated timber, it is possible to build even long span wooden bridges for relatively large loads. The advantage is that wood is able to support a short-term overload without adverse effects. Thanks to development of fasteners it is possible to design architecturally demanding and thus modern aesthetically attractive solutions of bridges and footbridges.

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CLIMATIC MONITORING OF TOURIST ATTRACTIVE CAVES

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Abstract
Impact of visitors and traffic on Kateřinská Cave microclimate (Moravian Karst, South Moravia, Czech Republic) has been studied since 2008. A long-term continuous monitoring of selected meteorological elements has been realized. The paper brings an overview of appropriate procedures and types of measurement techniques for quality measurement of the cave microclimatic conditions. A methodology for simultaneous measurement of external climatic conditions is also included. Comparison of internal and external climatic condition thus determines the differences between the values of meteorological elements inside and outside the cave. The data from the monitoring system in Kateřinská cave show the optimal measurement interval for most microclimatic measurements of the accessible caves one-minute and in the inaccessible caves 10, 15, 30 or up to 60 minutes. The importance of detailed cave microclimatic measurement is demonstrated by the episodes with high dynamic of meteorological elements.

Key words: cave management; microclimate; monitoring

Introduction

In previous years, the results of the monitoring of meteorological elements in accessible caves of the Moravian Karst were published by Středa et al., 2012, Středová et al., 2012; Rožnovský et al., 2010, and others). The caves are characterized by very small daily and annual amplitude of temperature and humidity, high relative humidity, low evaporation and strong annual or even daily course of wind speed and direction. Therefore the standard measurement procedures cannot be used for cave microclimatic monitoring. The research findings are involved in the "Methods of monitoring of microclimatic conditions in the cave systems". The methodology describes recommended methods of measurement to competent evaluation of the cave microclimate for scientific purposes as well as for the evaluation of climate change impact or influence of visitors.

Material and methods

The cave environment temperature regime was monitored in the Moravian Karst in Kateřinská Cave (Czech Republic, South Moravia). The cave system consists of corridors and three spacious halls with horizontal orientation trending SW – NE. "Hlavní dóm" hall, with dimensions measuring 96 × 45 × 20 m, is the largest underground space accessible to the public in the Czech Republic. The cave entrance is closed by a door with a hole for migrating bats. Annual attendance in Kateřinská Cave varies between 30 to 50 thousand visitors (up to 900 visitors in one day, maximum of 60 persons per group). Air temperature and air moisture at a height of 1 m was measured in representative areas, i.e., the entrance corridor and the deep main cave parts. Those areas and the external environment (measured with an external sensor in front of the cave entrance) were monitored by the U23 HOBO Pro V2 with a data logger, an accurate air temperature sensor. It took one minute for the interior sensor to capture air temperature differences caused by human attendance and other visitors. External sensors and interior control sensors measured at 15 minute intervals, and the fifteen minute averages were used for the air temperature evaluation. The surface temperature of the rock massif was measured with the Raytek MX4 Raynger® MX4™ IR thermometer. In addition to point measurements, the cave surface temperature for each season was also monitored by the Fluke Ti55 IR fusion technology IR camera with a thermal sensitivity ≤ 0.05°C.

Results and discussion

Recommendations for air temperature monitoring inside the cave

Appropriate devices for this purpose are the outdoor sensors with sufficient data logger capacity with own power supply and minimum resolution 0.01° C. The recording interval varied according to the type of the cave system and the measurement season. Interval of at least tens of minutes is suitable for the period of frequent and sudden temperature fluctuations. Measuring interval of one minute (with a resolution of at least 0.1°C or 0.01°C) is necessary when the cave is influenced by visitors.

Partial conclusion:
a) Sensor Resolution: 0.01°C.
b) Accuracy: ± 0.2°C.
c) Measurement interval: 1 min - accessible cave, max 1 hour - inaccessible caves
d) The interval of sensors calibration: 2 years.

Recommendations for air temperature monitoring outside the cave
Monitoring of temperature outside the cave is essential to quantify the influence of outdoor climate conditions on the cave temperature. Local circumstances and conditions must be taken into account. The sensors in radiation shields should be placed into climatically representative space (without any impact of buildings, heat sources, etc.).
Optimal measurement interval is ten minutes - with regard to daily temperature dynamics up to tens of °C. If the air temperature sensor is not included into meteorological stations, the suitable device is outdoor sensor with data logger with own power supply with a resolution of at least 0.1°C.

Partial conclusion:
a) Sensor Resolution: 0.1 ° C.
b) Accuracy: ± 0.2 ° C.
c) Measurement interval: 10 min.
d) The interval of sensors calibration: 2 years.
Recommendations for air moisture monitoring outside the cave
The caves are characterized by fairly high values of relative humidity. Air humidity of almost 100% and limited air exchange are observed in central parts of the caves with damp walls (typical stalactite cave). Measurement of air moisture in the caves is quite difficult (especially long-term measurement in constantly high moisture near saturation). Most of the moisture monitoring methods used in high humidity conditions (over 95%) is not punctual enough and their accuracy decreasing with exposure in this environment.

Partial conclusion:
a) Sensor Resolution: 0.1% RH.
b) Accuracy ± 2% relative humidity.
c) Measurement interval: 1 min - accessible cave, max 1 hour - inaccessible caves
d) The interval of sensors calibration: 1 year

Recommendations for monitoring humidity in the cave exterior
External air moisture varies more significantly than internal. A value of 100% has been reaching during the night and morning in favorable situations. The lowest values (around 30%) have been recording in the spring due to more significant temperature rise during the day.
Commercially available capacitive sensors with sufficient accuracy are sufficient to measure the external air moisture. Just in extreme cases (long-term episodes with high values – measurement in cold gorges, at the bottom of the abyss, etc.) is recommended frequent sensors replacement and calibration than two years.

Partial conclusion:
a) Sensor Resolution: 0.5% RH.
b) Accuracy ± 2% relative air moisture
c) Measurement interval: 10 min.
d) The interval of sensors calibration: 2 years

Recommendations for monitoring of internal rock surface temperature (IRthermometer)
The rock surface temperature inside the cave is an important element of the cave temperature regime. The infrared thermometer with adjustable emissivity and laser sight can be used for this monitoring. The advantage of the device is ability to measure temperature without direct contact with the object and without destruction of the cave interior. The temperature of solid rock must be removed in selected, well-defined points or throughout the whole cave system at approximately the same height and the same solid character, e.g. along the tour route.

Partial conclusion (General requirements for rock surface temperature measurement - IR thermometer):
a) The sensors resolution: 0.1 ° C.
b) Accuracy: ± 1.0 ° C.
c) Adjustable emissivity material (limestone ε = 0,98).
d) Interval of measurement: 1 month - the accessible caves, quarterly – inaccessible caves
d) The interval of sensors calibration: 2 years

Recommendations for internal rock surface temperature monitoring (IR camera)
IR camera imaging is suitable for the primary thermal survey and identification of sites with different temperature conditions. Thermal imagers with the detector of at least 320 × 240 with a high thermal sensitivity ≤ 0.05°C and "IR - Fusion" technology are recommend with regard to temperature and space parameters. The problem with thermal imager using is an exact determination of the emissivity for the subsequent generation of accurate surface temperature. However in practical field studies the relative values of temperatures that sufficiently indicate the surface temperature mode are usually sufficient.

Partial conclusion (General requirements for rock surface temperature measurement - IR camera):
a) The sensors resolution: 0.1 ° C.
b) Accuracy: ± 2°C or 2% (whichever is greater).
c) Adjustable emissivity material (limestone ε = 0,98).

Recommendations for internal air flow monitoring
Anemometers are installed in the cave system at pre-selected sites with a characteristic flow regime at the same height. Flow velocity in the cave system achieves relatively small values. Exceptions are narrow spaces connecting cave with external environment (entrance hall, chimneys, etc.). Therefore, it is necessary to measure the air flow in the caves by sensitive instruments. Cup or propeller anemometers have a relatively high threshold, i.e. the initial velocity, which starts up the rotation of rotating parts (for improved apparatus 0.2 $m.s^{-1}$. Ambulatory measurements can use thermal anemometers. The most widely used sensors for air flow speed measuring in the caves are ultrasonic anemometers.

Partial conclusion:
a) Sensor Resolution: 0.01 $m.s^{-1}$.
b) The threshold speed: 0.05 $m.s^{-1}$.
c) Accuracy: ± 2%.
d) Interval of measurement: 1 minute - the accessible caves, 10 minutes – inaccessible caves
d) The interval of sensors calibration: 1 year

Demonstration of the importance of detailed microclimatic measurements in caves
By default, visitor groups (max. 60 persons per group) entering into a cave in twenty-minute interval. A maximum amount of people in the cave is so ever 120. This state is in normal operation absolutely exceptional. The impact of visitors on cave microclimate is presented for the extraordinary episode from 2012. On May 5, 2012 a music concert was held in Kateřinská cave. 193 visitors spent 80 minutes inside the cave. At the same time the candles were placed there. The high dynamics of meteorological elements that exceeds standard monitoring fluctuations was recorded. The increase of air temperature in “Hlavní dóm” hall during the concert was 0.6°C (Fig 1 - blue line in a red ellipse). Fluctuations that are caused by normal traffic in these places is maximum 0.28°C (Středová et al., 2012) – presented in Fig 1 - blue line in the yellow ellipse (daily amount of visitors on May 5 2012 581, i.e. one of the highest attandance in 2012, the maximum temperature deviation 0.277°C).
Analysis of attendance influence on the Kateřinská cave temperature regime shows 5 – 6 hours lasting autoregulation of temperature regime even during high attendance (Středa et al., 2012).

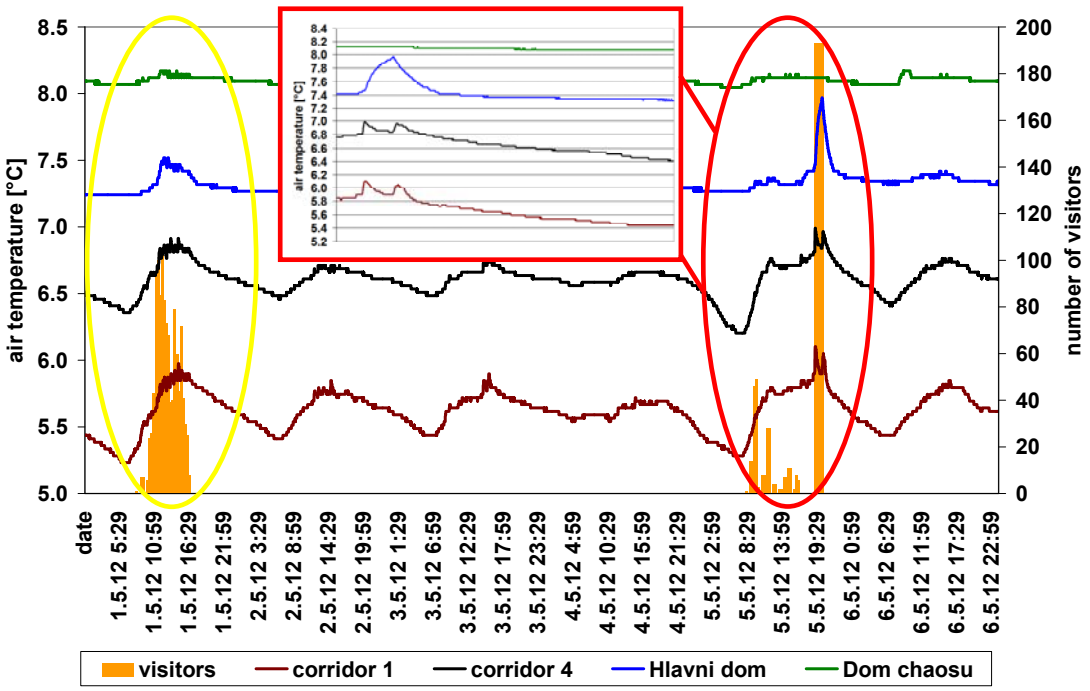

Fig. 1: Course of the air temperature in Kateřinská cave, May 1 to May 5, 2012

An intense increase of air temperature in entrance corridor was recorded only during the arrival and departure of guests (the inflow of warm air from the exterior) during the concert on May 5 2012. The temperature then normally decreased as external temperatures decreasing. Intense thermal fluctuation in "Hlavní dóm" hall immediately caused by stay of visitors during the concert lasted about 3.5 hours. The temperature was stabilized during the night. Air temperature returned to normal levels after about 9.5 hours after the end of the concert (24-hour detail during the temperature is shown in red outline diagram in Fig. 1). This corresponds to the similar conditions, indicating Calaforra et al. (2003). The changes in temperature inside Cueva del Agua de Iznalloz cave (Granada, Spain) were recorded already 2.5 min after the visitors entramce. Temperature memory effect of cave in attendance 980 to 2088 visitors per day is approximately 5-6 hours.
When a permanent load is 53 visitors the temperature in Cueva del Agua de Iznalloz is stabilized within 4-5 hours. Kermode (1979) attributed 3.6% of temperature changes to lighting effects in Waitomo cave.

Conclusion

Microclimatic monitoring is an essential part of the cave conservation management. Long-term monitoring of Kateřinská cave proved its dynamics and evaluated the impact of all factors. There was no significant effect of attendance on Kateřinská cave microclimate. During normal operation does not exceed carrying capacity of the environment. Significant impact with potentially harmful effects was not found out even in a single intensive load of the cave environment. Requirements for monitoring equipment and procedures for microclimate measurement of the accessible caves are based on the research results. The recommended methods can competently evaluate the cave microclimate for scientific purposes and to assess the impact of climate change or visitors.

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DEMONSTRATIVE CONSTRUCTION ON THE MOKŘADNÍ FOREST ROAD WITH NATURAL REINFORCEMENT AND LEISURE FACILITIES

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Abstract
The demonstrative construction was implemented within the framework of the Mokřadní forest road reconstruction. This forest road serves as a cycling trail. Due to its intensive use, emphasis was put on the natural character of the reconstruction and its inclusion in the surroundings. The demonstrative section of reinforcement was made using woodchips as a natural material; accompanying leisure features were implemented, such as means to overcome a ford and gain access to a marshland. It proves that the used reinforcement technology is successful in forest roads that have a multifunctional character, i.e. the forest roads where the expected volume of timber transport is not large and the road also serves for leisure.

Key words: forest road, reinforcement, woodchips, leisure

Introduction

In the past, waterlogged sections of forest roads were overcome using the technology called corduroy roads. In those times, forest roads were constructed predominantly by hands and roads were reinforced by stone pitching. When building a corduroy road, pole timber was laid across the road. The stone pitching technology was then replaced by rock crushed in the quarry and the coarse gravel (macadam) was then transported to the building site. Manual work started to be replaced with machine work. With this change, the technology of corduroy roads was gradually lost. At present, there are tendencies to revive this technology. Along with the change of manual installation of stone pitching to machine installation of coarse gravel, the manual construction of corduroy roads is replaced by a machine installation of crushed wood mass. The main advantage of this material is that it is a renewable resource and the earth surface is not exploited and transported in its production. Its production can use the wood mass created directly in the place of building (in the case of forest roads) and thus no transport is necessary. Compared to other technologies (geonets, geocells), this is a natural material.
The aim of the demonstrative construction was to verify the possible use of wood mass (in this case woodchips) to improve the bearing capacity of forest roads in their waterlogged sections. Local waterlogging appears in forest roads in the sections that are improperly laid out, i.e. they are designed along the contour line, and are not reinforced or have only operational reinforcement. These are usually short sections; despite this they can put all the forest road system located behind these places of local damage out of use. The current practice usually overcomes these sections by means of coarse gravel. However, this solution is temporary and needs to be repeated when necessary.

Material and Methods

The demonstrative construction was made as a part of project Repair of Cycling Trail 5080 “Mokřadní za Jedovnicemi” in the territory of the Training Forest Enterprise Masaryk Forest Křtiny. This cycling trail is located within the cadastral area of Jedovnice, south-east of Jedovnice behind Olšovec pond.
The technical condition of the cycling trail before the repair was terrible, the original reinforcement was completely missing and the subgrade was damaged by ruts. The remnants of stone pitching reinforcement were still visible. There was no longitudinal draining. A part of the road was waterlogged due to the level of underground water as the road was designed along an extensive marshland. Water flows over the road in one place in the periods of elevated underground water levels and high water levels in the marshland (Fig. 1).
In this part of the forest road the demonstrative construction was made, using reinforcement in the form of woodchips. First, it was necessary to modify the current surface into a roof-shaped or one-side sloping cross gradient. However, when the subgrade is too waterlogged and the road section has ruts, it is possible to form the demanded cross profile by filling the woodchips and forming the sloping from them – the cross sloping is important due to the draining function of the geotextile. The geotextile was laid on the prepared surface and covered with a layer of brown woodchips with 30 cm in thickness. This layer was again covered

with the geotextile. Further layers were the coarse gravel, fraction 32-63, 10 cm thick, and coarse gravel, fraction 16-32, 5 cm thick; the material was mixed, sloping was created with the roof shape and the surface was compacted. The surface was finally covered in quarry screenings (Fig. 2).

Fig. 1: The original condition of the forest road

Fig. 2: The built demonstrative section of forest road

Results
The result of the task is the implementation of the demonstrative section of operational reinforcement, which will serve as a practical example of an alternative technology for reinforcement of forest roads where the used material is based on the essence of forests – wood. Moreover, an information board is planned next to the construction providing lay and professional public with information on the historic ways of forest road construction and the current trends. The function of the reinforcement technology will be verified in operation and in the long term. The reinforced sections are also accompanied by leisure features, such as a cycling bridge to overcome a ford and a simple access to the marshland providing a view of the water surface (Fig. 2).
Other advantages are the possibility to present the activities of the department and faculty to the broad public and also the possibility to present an interesting example of forest road reinforcement in the case of conferences, seminars, tours or visits to our university.

Conclusion
The technology of woodchips increasing the bearing capacity of roads is mainly successful in forest roads that have primarily a multifunctional character and where no large volumes of timber transport are expected.

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DEVELOPMENT OF SPORTS AND RECREATIONAL ACTIVITIES IN THE CHOPOK AREA (NÍZKÉ TATRY MTS.) AND PROTECTION OF IMPORTANT LANDSCAPE ELEMENTS

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Abstract
One of the biggest sports and recreational centres in Slovakia is situated in the Nízke Tatry Mts., on the northern and southern slopes of Chopok peak (2 023,6 m a.s.l.). The whole complex concentrates on winter sports and that is why several ski slopes, ski-lifts and accommodation facilities have been built here. Since 2005 an extensive reconstruction of old technical facilities and ski slopes has been taking place in this area. Currently, an interconnection between main centres Chopok – north and Chopok – south is being developed, which makes the whole area even more attractive for tourism. However, these activities are connected to intensive construction activity in the vicinity of the ridge of Chopok. They are building new ski-lifts and ski-tows with extended capacity, new ski slopes are being built or the old ones improved and modified, the new infrastructure will be finished soon etc. All this has caused a relatively intense impact on the natural environment. From this point of view an important factor is that the whole centre is located in the National Park Nízke Tatry Mts. (NAPANT) area. Construction of these facilities, building slopes and modifying their surface have significant impact on existing landscape, relief and natural biotopes of this region. In locations that are directly influenced by these activities are observed significant changes in the structure and species composition within the phytocoenoses.

Key words: human impact, erosion, biotopes, nature protection, national park

Introduction

Currently (to 31.12.2012) there are 9 national parks, 14 protected landscape areas and 1 105 other protected sites in several categories (Nature Reserve, Natural Monument, Protected Site) in Slovakia. All the protected areas cover more than 23 % of the landscape of Slovakia. Almost whole area of Nízke Tatry Mountains belong to National park Nízke Tatry (NAPANT). NAPANT is the second largest national park in Slovakia (area of 72 842 ha) but with protection zone (area of 110 162 ha) represent the largest protected area in Slovakia.
Hereby there are a lot of interesting places used for recreation, sports and tourism. One of them is the area of the Chopok peak (2 023.6 m a.s.l.) including its north part (Jasna, Chopok – north) and south part (Chopok – south). It represents the biggest ski resort in Slovakia. Whole area of the Chopok belong to the core zone of the national park and conflicts of interests between nature protection and development of tourism are being solved.
From cca 2005 the modernization of the resort has been started. In the first period (2005 – 2007) in the area of Chopok – south improvement of existing ski slopes and building of some new slopes and lifts were realised: improvement of ski slope Srdiečko – Krupová, modernization and enlargement of ski slopes Dereše – Jelenia lúka – Krupová and Kosodrevina – Srdiečko, building of new ski slope Nad Srdiečkom – Krupová and building of new ski lift in the line Kososdrevina – Chopok. On the north side reconstruction and renewal of several ski lifts, e.g. new ski lift Chopok sever was built, works on new ski lift and ski slope Lúčky – Priečno have been started. In next period reconstruction works on ski slopes Chopok – Kosodrevina, Chopok – Derešská mulda were done, enlargement of the traverse Derešská mulda – Kosodrevina. Similar works were realised on the north part as well.
All these activities resulted to the elaboration of the study which solve renewal and realization of the connection of the both sides of Chopok. Main goal of this proposal is to build up the resort based on the history of tourism whiles looking at current development. Our main aim is to connect north and south parts of the resort with modern lifts, to increase the capacity of ski runs, snow making facilities, modern accommodation, restaurants and other services. In 2010 the environmental impacts assessment (EIA) and evaluation report have been done. All the building activities have already begun, and the main upper cable-cabin lift station has been built.
Regarding to already mentioned activities the research of chosen environmental elements has been started where our main focus is on vegetation changes and biotopes, changes in chosen species of flora, fauna and any other changes in the landscape.

Materials and methods

The contribution presents the results of the research from the study area of Chopok – south. The area is bordered by following altitudinal quotas Chopok (2 023.6 m a.s.l.), Kosodrevina (1 520 m a.s.l.), Srdiečko (1 213 m a.s.l.), Krupová (1 080 m a.s.l.), Jelenia lúka (1 465 m a.s.l.), Dereše (2 003.5 m a.s.l.) and by the ridge back to Chopok.

Inventory and mapping of the vegetation, biotopes and significant species of flora were done before realization of planned activities. The research was realised during the vegetation season in regular intervals due to capture all phenophasis of the year-vegetation development which is very important to determine, identification, observe and notice all individuals in the field and plotted on the map.

Phytosociological mapping was performed according to the methodology Zurich-Montpellier school, data was processed in compliance with Braun-Blanquet's principles (BRAUN-BLANQUET 1964). Classification of forests and dwarf pine stands was processed according to works MUCINA ET MAGLOCKÝ 1985, classification of grasslands, alpine meadows and shrub communities was according to work KLIMENT ET VALACHOVIČ 2007. Classificated communities were than classificated according to Catalogue of biotopes in Slovakia to particular category (STANOVÁ ET VALACHOVIČ 2002).

The nomenclature of species and categories of the endangered and endemic species are according to the Check-list of vascular plants (MARHOLD ET HINDÁK 1998) confronted with newer literature (FERÁKOVÁ ET AL. 2001, PIŠÚT ET AL. 2001). Protected species adhere to Decree of the Ministry of Environment SR No. 492/2006 as amended.

Changes of vegetation and plant species distribution on localities impacted by the planned activities are observed on long-term observation plots (POP – permanent observation plots). The plots have different shape and size according to biotopes and were established before building activities started. Documentation of existing state, vegetation and abundance of importance species of flora, eventually presence of important species of fauna was observed due to habitat and trophic relation. Database and map scheme were done for all the plots.

Results and discussion

Importance plant species

Protected species (species of European and national importance) endangered, rare and endemic species were mapped in the study area in montane, sualpine and alpine vegetation belt. Other for the study area, habitats and vegetation units important species were observed as well.

Regarding to nature protection, endangerment and endemism 41 species (Table 1) were observed in the territory right by the terrain research or abundance of these species conforming by older references. 21 of these species are included in category of protected species (according to Slovak legislation), *Campanula serrata* is species of European importance and other species are species of national importance. Formerly 5 more species were included in this category. Till 36 species are included into category of endangered species: EN (endangered) – 3 species; VU (vulnerable) – 14 species; LR:nt (lower risk, near threatened) – 18 species; DD (data deficient) – 1 species. *Diphasiastrum alpinum* is considered as rare species, which is confirmed by its rare abundance in the territory.

There are 12 endemic species, the most important of them are western carpathian endemic spesies *Crocus discolor* and *Soldanella carpatica* and *Leucanthemopsis alpina* subsp. *tatrae* and *Poa granitica* which belong to endemic spesies of Tatry. The other species belong to Carpathian endemic and subendemic species.

In Table 1 there are 8 species of the territory known just from literature, the research in 2005 and 2012 did not confirmed their occurrence. Information about the occurrence of *Crocus heuffelianus* and *Veratrum album subsp. album* are false because older data are from the period when all population of *Crocus* were interpreted as *Crocus heuffelianus* and *Veratrum album subsp. album* was misidentified with *V. a. subsp. lobelianum*. Data of *Poa granitica* are from the locality of Chopok which is now damaged by the building activities of upper station of cable cabin. Similar situation is with *Lilium bulbiferum subsp. bulbiferum* from the locality of ski slope Srdiečko – Krupová. The locality is impacted as well by enlargement and ground shaping of ski slope. There is also possibility of misidentification with *Lilium martagon* particularly in case of young and sterile individuals. Occurrence of *Pilosella cymosa* in ridge part of the territory is controversial.

We can assert that modernization of the ski resort Chopok – south caused that the most vulnerable localities are the surrounding of upper station of cable cabin, and ski slopes

in montane, subalpine and lower alpine vegetation belt. Small localities on the mountain ridge of following species were destroyed by the building activities: *Leucanthemopsis alpina subsp. tatrae*, *Poa granitica*, *Ranunculus pseudomontanus*, *Senecio abrotanifolius subsp. carpathicus* and *Soldanella hungarica*. Species occurred on ski slopes are the most threatened: *Aconitum firmum subsp. firmum*, *Crocus discolor*, *Dactylorhiza fuchsii subsp. fuchsii*, *Epipactis helleborine*, *Gymnadenia conopsea*, *Hylotelephium argutum*, *Listera ovata*, *Lycopodium clavatum*, *Soldanella hungarica*, where the directly affected plots are threatened almost the whole population.

We can expect significant degradation of localities of planned rescue track from Krupová to Chopok as well. This track will affect all the localities of important flora species mentioned in Table 1.

We need to assert that building and modernization activities have really negative effects on soil surface and all above mentioned species. Species have not appeared on localities of the POP in 5 year period. Different situation is with *Campanula serrata* and *Pilosella aurantiaca*. If these species occurred on impacted localities they spread very fast on localities with damaged vegetation cover and behave as pioneer species. This can observed from localities Kosodrevina and on upper part of ski slope Kosodrevina – Srdiečko.

Tab. 1: List of protected, endangered and endemic plant species

Species	Endan	End	Pro	Sig	Occ
Aconitum firmum Rchb. subsp. firmum	VU	K	4,6	N	++
Campanula serrata (Kit. ex Schult.) Hendrych		K	4,6	* E	++
Carex bigelowii Torr. ex Schwein.	LR:nt		6	N	+
Cetraria islandica (L.) Ach.	VU		6	N	+
Crocus discolor G. Reuss	LR:nt	KZ			++
Crocus heuffelianus Herb.	EN		6	N	lit.
Dactylorhiza fuchsii (Druce) Soó subsp. fuchsii	VU		6	N	+
Dentaria glandulosa Waldst. et Kit. ex Willd.		Ks			++
Diphasiastrum alpinum (L.) Holub	VU r		4,6	N	+
Doronicum stiriacum (Vill.) Dalla Torre	LR:nt		6	N	lit.
Empetrum hermaphroditum Hagerup	(VU)				+
Epipactis helleborine (L.) Crantz	LR:nt		§?		+
Euphrasia slovaca (Yeo) Holub	LR:nt				lit.
Euphrasia tatrae Wettst.	LR:nt	Ks			lit.
Gentiana punctata L.	LR:nt		6	N	++
Gymnadenia conopsea (L.) R. Br.	VU		6	N	+
Hylotelephium argutum (Haw.) Holub		K			+
Juncus filiformis L.	LR:nt				+
Leucanthemopsis alpina subsp. tatrae (Vierh.) Holub	VU	T			+
Lilium bulbiferum L. subsp. bulbiferum	VU		4,6	N	lit.
Lilium martagon L. subsp. martagon	LR:nt		§?		+
Listera ovata (L.) R. Br.	VU		§?		+
Lycopodium annotinum L.	LR:nt		6	N	+
Lycopodium clavatum L.	LR:nt		6	N	+
Pilosella aurantiaca (L.) F. W. Schultz et Sch. Bip.	VU				++
Pilosella cymosa (L.) F. W. Schultz et Sch. Bip.	LR:nt				lit.
Pinus cembra L.	VU		6	N	+ v.
Pinus mugo Turra	LR:nt				+++
Poa granitica Braun-Blanq.	VU	T	6	N	lit.
Poa laxa Haenke	VU		§?		+
Primula minima L.	LR:nt		6	N	+
Pseudorchis albida (L.) Á. Löve et D. Löve	EN		6	N	+
Pulsatilla scherfelii (Ullepitsch) Skalický			§?		+
Ranunculus pseudomontanus Schur	LR:nt	Ks			+
Salix herbacea L.	EN		6	N	+
Sempervivum wettsteinii Letz, ined. subsp. wettsteinii		K			++
Senecio abrotanifolius subsp. carpathicus (Herbich) Nyman	LR:nt		6	N	+++
Soldanella carpatica Vierh.	LR:nt	KZ	6	N	+
Soldanella hungarica Simonk.	DD	Ks	6	N	+++
Veratrum album L. subsp. album	VU				lit.
Viola lutea subsp. sudetica (Willd.) Nyman	LR:nt				++

Endan – endangered: **EN** – endangered; **VU** – vulnerable; **LR** – lower risk: **nt** – near threatened; **DD** – data deficient; **r** – rare (FERÁKOVÁ ET AL. 2001 and PIŠÚT ET AL. 2001).

End – endemic: **K** – endemic species of the Carpathians; **Ks** – subendemic species of the Carpathians; **KZ** – endemic species of the Western Carpathians; **T** – endemic species of the Tatry Mts.

Pro – protected species (Law No. 543/2002 C.L. on nature and landscape protection as later amended, Decree No. 24/2003 C.L. and Decree No. 492/2006 C.L. which implementing the Law No. 543/2002 C.L.): **4** – protected by Annex No. 4 of the Decree No. 492/2006 C.L.; **6** – protected by Annex No. 6 of the Decree No. 492/2006 C.L..; **§?** – was protected by older legislation.

Sig – significance: ***** – priority species; **E** – species of European importance; **N** – species of national importance.

Occ – occurrence: **+++** – numerous species, or as forming a continuous stands; **++** – species with frequently occurrence; **+** –species with rare occurrence; **v.** – planted species; **lit.** – occurrence of the species only on the basis of literature data.

Importance biotopes

In the territory the full-area vegetation mapping was realised. All the plant communities were included and classificated according to Catalogue of biotopes of Slovakia (STANOVÁ, VALACHOVIČ ET AL. 2002) and legislation mainly due to evaluation of the territory regarding to NATURA 2000 network. The survey of biotopes and vegetation units is in Table 2. In evaluation process we focused our interest mainly to assessment of impacts of all human activities and changes of the biotopes of European and national importance.

Major part of gained results from evaluation of the vegetation and biotopes has the character of initial data. These data were gained in the period before building activities started (in 2004 and 2005) – composition and distribution of vegetation units is in compliance with the development of vegetation from historical human attacks. Second database is from the period after ground shaping and realization of building activities into habitats (from 2007 – 2011). These data can be considered as a base for observing of natural restoration of impacted localities and for evaluation of appropriation of recultivation and revitalization.

Time schedule of actual observation on POP is very short and we have not enough data to documentate dynamic of landscape changes. Particularly in subalpine and alpine vegetation belt because changes and regeneration of landscape is very low. This highlights the vulnerability of the territory.

Building of new ski slope Nad Srdiečkom – Krupová and enlargement of lower part of the slope Dereše – Jelenia lúka – Krupová caused the biggest attacks into forest biotopes. Mainly biotopes *Acidophilous spruce forests* (Ls9.1, area of 4.5 ha) and *Asperulo-Fagetum beech forests* (Ls5.1, area of 3.5 ha) were impacted the most. *Dwarf pine stands biotope* (Kr10) were damaged on the area more than 5.5 ha. The largest cutting of dwarf pine was realised on ski slope Chopok – Kosodrevina (cca 3.7 ha) and other cutting were on ski slopes Chopok – Derešská mulda, Dereše – Jelenia lúka and on traverse Derešská mulda – Kosodrevina.

From herb and grassy biotopes *Riparian vegetation with Petasites* (Br6) and *Alpine tall herb communities* (Al5) were damaged by the ground shaping of the slopes and also conditions for their existence changed significantly.

Although the most spread grassy-herb habitat in subalpine and lower alpine vegetation belt is biotope *Tall grass communities of mountain plains on siliceous substrates* (Al6), realized impacts did not caused strong changes in their structure and conditions of their existence. At the same time we can assert that communities of this habitat have (on condition of preserving of natural habitat conditions) relatively very high level ability of regeneration in relatively short time.

Ground shaping and revitalization of the landscape

In the frame of the evaluation of impacts of realised activities on important flora species and habitats we did the proposals of revitalization activities of damaged localities. These proposals are based on knowledge of site conditions of the territory, and on knowledge and character of local flora and vegetation. Actually these activities were not accepted. We will mention several examples.

On the ski slopes where dwarf pine stands had to be harvested we proposed stage group cutting, preserving of grassy vegetation and herb layer of undergrowth. These vegetation would be base for revitalization of deforested plots. The whole process was pointed to replacement of biotope Kr10 by biotope Al6.

Actually clear cutting of whole area and ground shaping of ski slope were done. Dwarf pine individuals were sawed cca 30 – 50 cm above soil surface and all the harvested biomass were put on stocks as a prevention against erosion and snow sliding. Immediately after such activity all herb vegetation was damaged and there was no restoration below branch-wood. In winter

and spring time they eliminate snow sliding but there was erosion and soil transport on localities without vegetation in summer time. On surface there were just stones and stony blocks, sites started to be unstable. On the base of above mentioned facts they started to move sawed biomass but generally destruction of sites was really high and regeneration and revitalization of the landscape started to be complicated and it will take longer time.
The second very negative attacks to the environment were ground shaping and enlargement of existed ski slopes. There were proposals to preserve grassy and herb vegetation on ski slopes. The plant species composition of these stands was natural and adapted to the local site condition with dominancy of local natural species (almost all apophytes were eliminated there). In compliance to altitude and site conditions it was proposed to renewal of communities of grasslands biotopes (for example meadow or pasture biotopes, biotope Al6 etc.).
Actually surface of the ski slopes was shaped by big machines, natural vegetation was removed and on some parts of slope they put stony material and soil to the height 0,5 – 1 m. Even under flooding localities were not excluded (localities of biotope Br6). Often only in next year's they build the drainage of the slopes. Bare soil was leaved for natural regeneration or sowed by grassy seeds of our original grassy species, but not species typical for this locality and altitude. The result is large erosion and transport of unstable soil and stony material, bad regeneration of grasslands, occurrence of ruderal vegetation and not natural and original species for this area.
All these processes are monitored in the network of long-term plots (POP) and in the future we will realize complex monitoring of current state. We assume that the results of the monitoring will help us to enforce appropriate arrangements in case of realization of future activities in Nízke Tatry Mts., Vysoké Tatry Mts. or other places in Slovakia.

Tab. 2: List of biotopes of European and national importance

Code SK	Biotop (Slovak name)	Code NATURA	Biotop (NATURA 2000 name)	Vegetation unit of the monitored area
Ls5.1	Beech and fir-beech flowery forests (bukové a jedľovo-bukové kvetnaté lesy)	9130	*Asperulo-Fagetum* beech forests	- *Dentario bulbiferae-Fagetum* (Zlatník 1935) Hartmann 1953 - *Dentario glandulosae-Fagetum* W. Matuszkiewicz 1964
Ls5.2	Acidophilous beech forests (kyslomilné bukové lesy)	9110	*Luzulo-Fagetum* beech forests	- *Calamagrostio villosae-Fagetum* Mikyška 1972
Ls5.3	Maple-beech mountain forests (javorovo-bukové horské lesy)	9140	Medio-European subalpine beech woods	- *Aceri-Fagetum* J. et M. Bartsch 1940
Ls9.1	Blueberry spruce forests (smrekové lesy čučoriedkové)	9410	Acidophilous spruce forests (*Vaccinio-Piceetea*)	- *Vaccinio myrtilli-Piceetum* (Szafer et al. 1923) Šoltés 1976 - *Calamagrostio villosae-Piceetum* (R.Tx. 1937) Hartmann 1953
Kr10	Dwarf pine scrub (kosodrevina)	4070*	Bushes with *Pinus mugo* and *Rhododendron hirsutum*	- *Vaccinio myrtilli-Pinetum mugo* Hadač 1956 - *Athyrio distentifolii-Pinetum mugo* (Hadač 1956) Hadač in Mucina et Maglocký 1985;
Ls1.4	Mountain alder alluvial forests (horské jelšové lužné lesy)	91E0*	Mixed ash-alder alluvial forests of temperate and Boreal Europe	- *Piceo-Alnetum* Rubner ex Oberd. 1957 - *Alnetum incanae* Lüdi 1921
Br4	Mountain rivers and their ligneous vegetation with *Salix elaeagnos* (horské vodné toky a ich drevinová vegetácia s vŕbou sivou)	3240	Alpine rivers and their ligneous vegetation with *Salix elaeagnos*	- *Salicetum incano-purpureae* Sill. 1933
Br6	Riparian vegetation with *Petasites* (brehové porasty deväťsilov)	6430	Hygrophilous tall herb fringe communities of plains and of the montane to alpine belts	- *Aconito firmi-Rumicetum alpini* Unar in Unar et al. 1985 - *Chrysosplenio alternifolii-Petasitetum hybridi* Hadač et Soldán 1989
Al5	Alpine tall herb communities (vysokobylinné spoločenstvá alpínskeho stupňa)			- *Ranunculo platanifolii-Adenostyletum alliariae* (Krajina 1933) Dúbravcová et Hadač ex Kočí 2001
Al1	Alpine grasslands on siliceous substrates	6150	Siliceous alpine and boreal grasslands	- *Juncetum trifidi* Szafer et al. 1923 em. Krajina 1933

Code SK	Biotop (Slovak name)	Code NATURA	Biotop (NATURA 2000 name)	Vegetation unit of the monitored area
	(alpínske travinno-bylinné porasty na silikátovom podklade)			- *Seslerietum distichae* Krajina 1933 - *Junco trifidi-Festucetum supinae* Krajina 1933 - *Ranunculo psedomontani-Caricetum sempervirens* (Krajina 1933) Dúbravcová ex Dúbravcová et Jarolímek in Kliment et Valachovič 2007 - *Oreochloo distichae-Salicetum herbaceae* Krajina 1933
Al2	Alpine snow-patch communities on siliceous substrates (alpínske snehové výležiská na silikátovom podklade)			- *Luzuletum obscurae* Szafer et al. 1927 corr. Dúbravcová in Kliment et Valachovič 2007 - *Festucetum picturatae* Krajina 1933 corr. Malinovsky et Kricsfalusy 2000
Al6	Tall grass communities of mountain plains on siliceous substrates (vysokosteblové spoločenstvá horských nív na silikátovom podklade)	-	-	- *Vaccinio myrtilli-Calamagrostietum villosae* Sillinger 1933 - *Festuco picturatae-Calamagrostietum villosae* Pawłowski in Pawłowski et al. 1928 corr. Kliment et al. 2004 - *Phleo alpini-Deschampsietum caespitosae* (Krajina 1933) Coldea 1983
Al9	Heath and small-shrubs communities in sub-alpine and alpine levels (vresoviská a spoločenstvá kríčkov v subalpínskom a alpínskom stupni)	4060	Alpine and boreal heaths	- *Avenastro versicoloris-Vaccinietum myrtilli* Krajina 1933 - *Cetrario nivalis-Vaccinietum gaultherioidis* (Hadač 1956) Hadač ex Šibík et al. 2007
Tr8	Flowery alpine and mountain *Nardus* grasslands on siliceous substrates (kvetnaté vysokohorské a horské psicové porasty na silikátovom substráte)	6230*	Species-rich *Nardus* grasslands on siliceous substrates in mountain and submountain areas in continental Europe	- *Agrostio pyrenaicae-Nardetum strictae* (Sillinger 1933) Šomšák 1971 corr. Dúbravcová in Mucina et Maglocký 1985 - *Phleo alpini-Nardetum strictae* Klika 1934
Sk2	Silicate rocky slopes with chasmophytic vegetation (silikátové skalné steny so štrbinovou vegetáciou)	8220	Chasmophytic vegetation on siliceous rocky slopes	- communities of the alliance *Androsacion vandelii* Br.-Bl. in Br.-Bl. et Jenny 1926 corr. Br.-Bl. 1948 - communities of the alliance *Hypno-Polypodion vulgaris* Mucina 1993
Sk3	Siliceous scree of the montane to alpine levels (silikátové sutiny v montánnom až alpínskom stupni)	8110	Siliceous scree of the montane to snow levels	- communities of the alliance *Androsacion alpinae* Br.-Bl. in Br.-Bl. et Jenny 1926

Conclusion

On the base of ski resort Chopok juh we tried to showed the most important problems connected to realization sport and recreational activities in montane and alpine environment. We aimed to some problems of evaluation of human impacts on environmental components, evaluation of state and changes of flora and vegetation of the territory and evaluation of appropriateness and effectiveness of realized activities. Complex of problems is much more bigger, we have to take to account also impacts on elements of abiokomplex, zoology of habitats etc. Our aim is to solve all these question and contribute to harmony between nature protection and preserving of important environment elements and current possibilities of using of the landscape for human activities.

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DYNAMICS OF CLIMBING SECTORS IN PROTECTED AREAS

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Abstract
The development of sport climbing in recent years means increased burden for rock faces. This growth is important to take note of in the areas that are subjected to territorial nature protection. The subject of this protection is threatened by increased attendance and by high ballast of geobiotopes. Quantification of the growth in using rock faces is possible by expression of development in a number of climbing routes. Value expression of its difficulty is also useful. This assumption is based on the need for increasing rock face capacity just by creating new routes. Studied areas were chosen with different levels of nature conservation (PLA, NM, NNR etc.).

Key words: Nature conservation, sport climbing, climbing route, difficulty

Introduction

Sport climbing enjoys massive development in terms of number of climbers and in the quantity of concrete climbing localities, routes and lines (Cater, 2008). This development is noticeable in every outdoor or adrenalin activity. We can say this rise in attendance means higher potential in disturbance of the rock environment and itsgeobiotopes (Larson, Matthes, Kelly, 2000). The management of territorial protected areas should have a rising burden as an object of interest. The object of conservation is influenced, mainly in negative ways (Kohn, Bajer, 2012). Destroying of soil surface causes erosion and creation of trails represses vegetation; damaging of superficial roots, noise, disturbing of animals etc. are noticeable as well (Cílek, 2010). A destruction of holds and footholds is one of the most typical and obvious effects on microrelief of rock faces (Hušek, 2008). However, impacts on vegetation cover are also considered as a major problem (Kohn, Bajer, 2012). The question of magnesium usage is still open (Kohn, 2012).

A quantification of the growth in using rock faces is possible by the expression of development in the number of climbing routes and development in its grades. This assumption is based on the need of the increasing rock face capacity. However new routes are established in places where the previous climbing was unimaginable, usually because of high difficulty and high demands on the human body. When the climber's performance got better, these places were conquered and the new line was born. The aim of this article is to show the dynamics in the development of climbing sectors in Moravia, especially from the view of climbing performance, in creating new routes.

Material and Methods

Sectors

The sectors were chosen in areas with different levels of nature conservation:

Rock face: **Indie**

Nature conservation: NR Sloupsko-Šošůvské caves, PLA Moravian Karst; climbing is allowed throughout the whole year, while placing of bolts and creation of new routes is banned without permission from the Regional peak commission South Moravia.

Geology and geomorphology classification: DrahanyHighlands, Moravian Karst, Suchdol Plateau (Cenia, 2013). The rock face consists of Devonien and Rif limestones, Macocha formation, Moravian-Silesian paleozoicum of the Bohemian Massiv (Bokr, 2013).

Recreation: The sector is near the very attractive Sloupsko-Šošůvské caves. Almost all visitors of this sector are climbers. The sector neighbours with aplayground.

Rock face: **Obří kámen**

Nature conservation: NNRDěvín-Kotel-Soutěska, PLAPálava, biosphere reserve UNESCO; climbing is allowed from 1. 9. till 31. 12. during the timesof 9:00 am till 6:00 pm.

Geology a geomorphology classification: The Mikulov highlands and Palavahills (Cenia, 2013). The rock face also consists of Jurassic compacted limestones (so called the Ernstrbrunnlimestones) often with dolomite admixtures that are a part of the Outer Western Carpathianflyschnappe(Bokr, 2013).

Recreation: Attractive area for tourism. There are tourist routes and the nature trail 'Děvín'. We can also find the castle Neuhaus ruinsthere.

Rock face: **Kozel**
Nature conservation: NM, climbing is allowed throughout the whole year and creation of new routes is banned without permission from the administrator of the rock area.
Geology a geomorphologyclassification: The Chřiby Highlands, the Stupava highlands, the Chřiby ridges. Medium – large coarse grain Quartz (Arkose) Glauconite sandstones – Lukov layers of Soláň formation, Račanská unit, a part of the Outer Western Carpathien magura flysch nappe (Adamovič, Mikuláš, 2010).
Recreation: There is a tourist route. Rock surface is marked by vandals; there is a big colour sign: KOZEL. The place has many legends.

Rock face: **Králky**
Nature conservation: NM, climbing is allowed throughout the whole year, creation of new routes is banned without permission from the administrator of the rock area.
Geology a geomorphology classification: Hostýn-Vsetín Mountains, Hostýn hills, Lukov highlands. Medium – large coarse grain Quartz (Arkose) Glauconite sandstones - Lukov layers of Soláň formation, Račanský unit, a part of the Outer Western Carpathien magura flysch nappe (Adamovič, Mikuláš, 2010).
Recreation: The area is interesting for tourists; there are tourist routes and the nature trail 'Lukov'. Nearby, there is a castle with the same name. Under it, we can find a little rock town. The rock surface isn't marked only by climbers, tourists also make engravings here. There are also inscribed seats and stairs but its origin is uncertain.

Methodology
The analysis of development of the number of routes from 1951 till 2010 was always made for concrete rock face. The data was divided into 5-year intervals. A database stated in the last published book guide is considered as relevant (Skýpala, Wolf, 2010). Variants of routes are considered as separated routes, if also the gradewas stated. Projects and routes with unknown years of establishment were abstracted.
For UIAA,a comparison table to point valuewas made using the scale of grades (e.g. 8+ = 8.333). For lines expressed in a technical grade, the point value on the basis of the grade without the technical addition was assigned (e.g. VI A0 = 6). If the old technical route was free climbed, the old grade is counted. Thus 5-year intervals are connected with creation of new routes (cumulative frequency) and with data of the sectors average grade expressed in point value.
The correlation analysis was performedin the software 'Gretl'. The regression analysis with the method of least squares was performed too. As an explanatory variable, an average grade in the climbing areawas chosen and as a dependent variable, the cumulative frequency of routes in the climbing areawas chosen.

Results
The data from all 4 areas together proved thatevery other new route will be probably harder (higher grade) than the average grade in the area (*corr=0.98*). The dependency of the cumulative frequency and the average grade was shown as significant (R^2*=0.96, p<0.00001*).It is the explanation of earlier occupation of easy lines by pioneers, and later occupation of hard lines by their successors with higher performances. The question about causality has to be considered. We assume that there is a higher probability that the increase in climbing performance causes the creation of new routes rather than the creation of new routes causing higher climbing performance. Although the route is graded after its establishment; a growing trend on both graphs is obvious (Graph 1, Graph 2).
The whole dynamics is observable from the graph. In individual sectors, we can observe waves of interest – in the Moravian Karst in the 1980s and at the beginning of the 1990s. (This trend hasn't stopped yet).While for the Moravian sandstones, it only started after the turn of the century (Graph 2). So the increase in climbing attendance started in the Moravian Karst earlier. Pálava is shown as a historical area with "banning" shocks, in the mid-1980s climbing activity was banned (Graph 2) by authorities of the state nature protection (Skýpala, Wolf, 2010).

Discussion

The spatial capacities for the creation of new routes are almost exhausted in most of the areas. At this moment, the number of new routes startsnot to be useful as an indicator of attendance. In addition, the climbing revitalization of old stone quarries means that almost all potential lines are doneduring a short time. Thus we can express the dynamics in one year. For example in a former limestone quarry 'Černotín' in the Hranice region, almost 90% of routes were made in 2003. Today, the creation of new routes is banned without permission from the administrator of the rock area (Skýpala, Wolf, 2010). This ban is also valid for Kozel or Králíky. Although the pressure is still on the creation of new routes in sectors without the ban and therefore the variants of variants start occurring (it is interesting, that this situation is present only in high grades, which confirms our thesis about pressure on the creation of new routes by higher climbing performance), or routes with banned holds. It means the route is defined by certain holds which are allowed or not allowed to use during climbing. These holds belong mostly to neighbour routes and its use would mean an unclean climb. At this moment, the administrator of the rock climbing area should be present with a restriction. Similar places of origins, for example are in Roviště (Vltava's granit) or in Kolíbky in Rudice (Moravian Karst). Places with higher concentration of difficult routes are strong attractions for sport climbers and these routes tend to be frequently used. It would be interesting to compare the use of these routes with a high grade and routes which are easier and which are known for theirslipperiness. They aren't used as much as the more difficult routes, but they can be climbed by a wider range of climbers.

We can also say the karst areas are more protected at higher levels, especially protected areas, while the Moravian sandstones are protected at a lower level. Karst areas have, considering their expanse and the character of material, predispositions to higher concentrations of routes with high grades. It is probably a conflict of interests, as we said; the Moravian Karst has become a favourite around the year 1980, and smaller areas with no such potential (Moravian sandstones) has become a favourite around the year 2000. Is this proof of higher attendance around the whole of Moravia?

The question is, if the dynamics of sport climbing rock faces in especially protected areas is different from dynamics in unprotected areas. The only barrier is, in our opinion, the giving of exceptions from the ban or reservation of places to practiseclimbing. Their effectiveness is noticeable from the example of 'Pálava'. The ban of climbing during the year can be considered as a success, because it is mostly respected and forced by administrators of the rock areas.

Conclusion

The increase in climbing performance means the pressure is on creating new routes and on the aesthetics of rock faces in the future. The next development of rock faces is unknown, as attendance will probably increase. The regulation of attendance can be done with instruments of management, which should valuate time and spatial suitability. This is a matter of efficiency. The average grade in the area and the number of routes are significant determinants of attendance, which can predict future developments of burden on the concrete ecosystem. Although attendance is also determined by other factors, for example Camp and Knight (1998) show indirect dependency between the distance from the parking lot and climbing intensity. Absolute numbers of attendance aren't and probably will not be available. So we consider our methodology as one of the options as to how we can study climbing attendance in the future;particularly because it is simple and financially undemanding.

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EFFECT OF TOURISM ON THE SURFACE WATER QUALITY IN THE RESERVOIR SYSTEM JINOLICKÉ RYBNÍKY (JINOLICE PONDS)

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Abstract
A group of Jinolice ponds (named after a nearby village) is located in the centre of PLA Český ráj (Czech Paradise) and it is a popular leisure destination.
The pond at the highest altitude, Oborský, is frequently used as an outdoor swimming facility. Due to its large number of users, shallow depth and a negligible amount of running water coming into the pond, strong eutrophication develops almost every summer. The polluted water then continues to the other two connected ponds.
This report on evaluation of the surface water quality in Jinolice ponds will assess the water quality based on results of the monitoring of selected indicators and their laboratory analysis. Both field tests and laboratory analysis have been carried out over a one-year period from IV/2011 to III/2012. The samples used for the analysis were obtained from four different locations – a tributary of pond Oborský and areas close to the outlets of all the three ponds.
The results of the investigation show that a frequent usage of pond Oborský for leisure purposes has had a negative impact on water quality in the two other ponds. Due to the close proximity and communication between the ponds and their shallow depth, the process of self-cleaning is significantly reduced.

Key words: eutrophication, self-cleaning process, leisure use

Introduction

On the one hand, human beings have taken care of and used the landscape of the Český ráj (Czech Paradise) for generations, on the other hand, they have respected it and left it to its own spontaneous development. This area boasts values that cannot be found anywhere else.
The landscape of the Český ráj has something that many other places in the Czech Republic miss – *genius loci* – a spirit of a place.
The unique atmosphere of the picturesque landscape of the Český ráj has been attracting visitors not only from the Czech Republic for over half a century. The number of visitors increases every year, which brings many problems. The high visitor rate is sometime inadequate and is a cause of erosion, disappearance of plants and animals, decrease in the quality of the soil and water ecosystems. The area attractiveness and the easy accessibility from large towns pose a risk of a gradual building up of the territory and negative changes in the life style of inhabitants who are losing their relationship with the soil.
Many of the people coming to the Český ráj are not interested in historical and cultural sights only; they also want to do leisure activities, and this is reflected in the quality of water. Although ponds are not natural but artificial, some time after their establishment we perceive them as a natural part of the landscape. Although they are not the main landscape forming elements, they play important roles there and are inseparable from the landscape of the Český ráj. [3]
Water is the most spread substance on the Earth and also a vital condition for life. During its cycle, mainly in contact with humans, its quality changes – chemical admixtures, colour, temperature, etc. Water has a great self-cleaning ability and humans have not been able to devaluated water for ever, yet. As the number of inhabitants grows, their demands increase as well as the total volume of consumed water. We cannot waste water in the Czech Republic as we gain most of our water from precipitation. We felt its lack in the years when precipitation was below standard. In comparison with other countries, we have sufficient volume, but its quality varies.
Water quality generally means the value of the set of its properties from the perspective of its suitability for various kinds of usage, its level of toxicity for organisms or generally in relation to the natural environment. We consider its various physical, chemical and biological properties. Based on the quantification of the individual properties of water and their comparison with a pre-established scale of values, we define the water quality and the level of its load. [2]

Material and methods

Jinolice ponds are located along the road connecting municipalities Jinolice and Březka, north-east of Jičín, at an altitude of 315–325 m a.s.l. They were created under the slopes of

the Prachovské skály and Přivýšina. In the 1950s and the 1970s, the original waterlogged meadows in the vicinity of the reservoirs were drained by means of a system of superficial land drains and belts of alders.
Jinolice ponds are a system of three adjacent reservoirs on a no-name left tributary of the Javornice river, which flows into the Libuňka river at Libunec and that then flows to the Jizera river in Turnov. The system of reservoirs consists of ponds Vražda, Němeček and Oborský (see fig. 1). They acquired their current appearance when they were built in 1950 for water management reasons, especially for retention of water as a protection of the territories lying below against high water and for improvement of discharge in the drainage basin of the Libuňka. Jinolice ponds are located in Protected Area of Natural Water Accumulation Severočeská křída.

Fig. 1: Jinolice ponds (www.mapy.cz)

Pond Oborský is the largest of Jinolice ponds and it lies the highest along the stream. The total area is 130,112 m^2, out of which 114,000 m^2 is water. It is a through-flow pond with an average altitude of 320 m a.s.l. [5] The sand and mud bottom has a gradual slope to a depth of 3.5 m. [6] The reservoir is a part of drainage basin no. 1-05-02-013 (Javornice). It is supplied by two springs, one of them is in the forest above the pond, the other near settlement Prachov. This area belongs to fishing district Libuňka 2 (sport fishing). These are waters without trout, the main species are carp, crucian carp, roach, grass carp, pike, and sander.
Pond Oborský has an earth dam with a tar road on its western side. This allows access to Autokemp Jinolice, which is located on the southern side of the pond and which includes a parking site along the entire dam. In the middle of the dam there is an outlet which takes water from Oborský to the following pond Němeček. The dam bears signs of places used by fishermen for sport fishing. The intake part of the dam above the water surface is covered in reed and woody plants, predominantly self-seeded alder.
There are leisure facilities along the entire left and right banks and a part of the bank has been covered in imported sand by which sandy beaches were created. These are connected to the dam on both banks. There is a camp site and several mainly timber buildings providing refreshment on the left (southern) bank. There is a hut camping and a car camping on the right (northern) bank. The eastern part of the banks is covered in reed and alder.
Pond Oborský is, in compliance with act no. 258/2000 Coll., as amended, a natural swimming pool and as such it is subject to monitoring by the Regional Hygiene Station (RHS) in Hradec Králové. The RHS takes samples at the public camp site and at camp Eden and performs analyses of water every year from May to September. In case the quality deteriorates and human health is endangered, the RHS issues a bathing ban. The results of the last 7 years are presented in Fig. 2.

The Autokemp Jinolice on the southern bank continues along the southern bank of pond Němeček. There are wooden huts with a total capacity of 55 beds, and a large area for tents and house trailers. Camp Eden on the northern bank has about 280 places in various types of accommodation (the main brick building, huts, prefabricated timber houses, mobile homes) and an area for house trailers and tents.
This place is located in the 3rd zone of nature protection of PLA Český ráj. The pond is incorporated in the protection zone Natural Monument Oborská luka, which was pronounced on January 1, 1990, and which is a part of the TSES system as a local biocentre. The subject of protection is moist wildflower meadows with protected and endangered plant species.
NM Oborská luka lies on the eastern bank of Pond Oborský, about 1 km to the south of municipality Březka, and has an area of 11.81 ha. Moist peat meadows with a number of rare plant species have appeared in the flood area of Oborský. The occurring communities belong to alliance *Caricion davallianae*. There are e.g. *Carex davalliana* Sm., *Dactylorhiza majalis*, *Trollius altissimus*, *Scorzonera humilis*, *Salix rosmarinifolia* and Green-veined orchid - *Orchis morio*. For the Green-veined orchid the Oborská luka is one of the last locations in Eastern Bohemia. There are also the common lizard (*Zootoca vivipara*) and the grass snake (*Natrix natrix*). The inventory revealed 172 beetle species. [2]

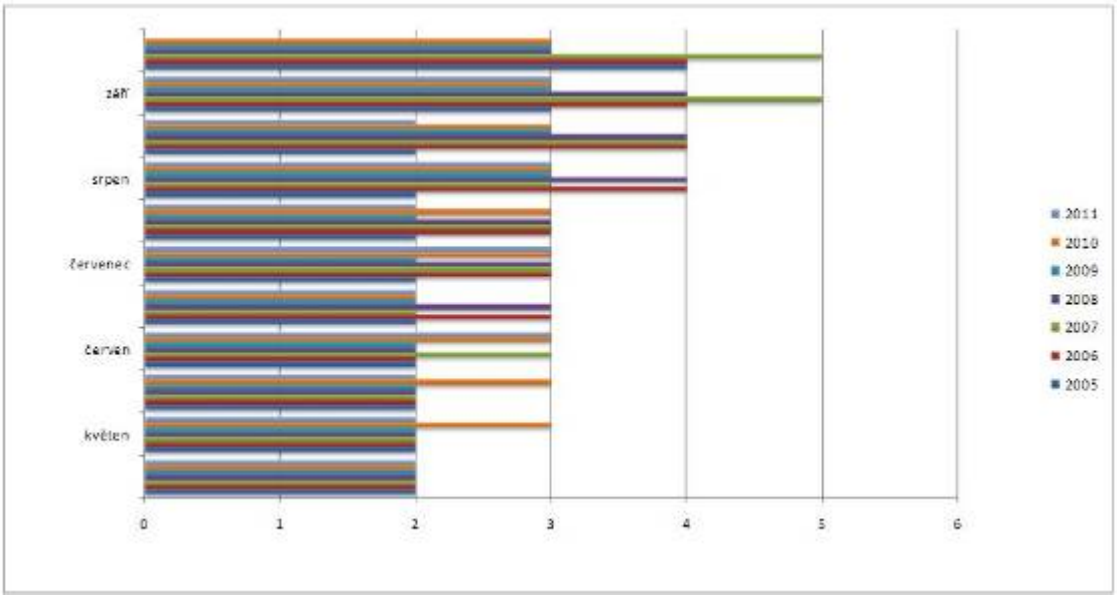

Fig. 2: Water quality inspection by RHS for usage of pond Oborský as a natural swimming pool

Pond Němeček is a through-flow pond adjacent to pond Oborský. Its total area is 69,500 m^2, out of which 52,000 m^2 is water. The pond is located in drainage basin no. 1-05-02-013 (Javornice). It lies on a no-name left tributary of the Javornice river, which springs in the forests above Pond Oborský. Besides water from Oborský, Němeček is also supplied by a small stream springing in the forest south of the pond. The fishing district is Libuňka 2 (sport fishing), water without trout.
The southern bank of the reservoir has space for tents and it is a part of Autokemp Jinolice. Camp visitors can use showers, washing rooms and toilets. The waste water from these facilities, just as the waste water from the refreshment stands, goes to a subsurface flow constructed wetland that is located in the south-eastern bank of pond Němeček. This pond is also the recipient of the reclaimed water.
There is a Hut Site Jinolice on the northern bank. There are 80 places for house trailers or tents and 85 beds in huts. Waste water from its facilities is collected in a pit and regularly disposed of.
The pond is located in the 3rd zone of nature protection of PLA Český ráj and partially in the protection zone Natural Monument Vražda.
The pond has a shape of a nearly regular letter L. The reservoir has an earth dam with a road without reinforcement on the eastern side. There is a concrete outlet in the dam. Water outlet (a chute about 150 m long) is accompanied by trees and shrubs and flows into pond Vražda.

Pond Vražda has the smallest area of the three Jinolice ponds. Its total area is 41,718 m^2, out of which 29,000 m^2 is water. It is a through-flow pond.
It is located in drainage basin no. 1-05-02-013 (Javornice). It lies on a no-name left tributary of the Javornice river, which springs in the forests above Pond Oborský. It is a part of fishing district Libuňka 2 (sport fishing) and of the 1st zone of nature protection of PLA Český ráj.
It is located in an immediate vicinity of municipality Malá Jinolice. It has an earth dam, which is covered in permanent grassland. The outlet is connected to the dam by a service bridge. The banks are covered in reeds and grown trees.
Natural Monument Pond Vražda was pronounced in 1999 to protect moist bog meadows with rare and endangered plant species. The total area is 6.27 ha and consists of the pond and the peat meadows on its southern bank. The boggy meadows on its bank belong to alliance *Caricion davallianae*. The species growing there are e.g. *Carex davalliana* Sm., *Dactylorhiza majalis*, *Trollius altissimus*, *Scorzonera humilis*, etc. The waterlogged meadows are a suitable environment for the common lizard, the grass snake and the agile frog (*Rana dalmatina*). The inventory found only 85 species of beetles, usually common. The reason is probably eutrophication of the pond littoral and a small range of natural habitats.
The water quality in reservoirs Jinolice ponds was evaluated between April/2011 and March/2012. Pond Oborský is supplied by two tributaries, the one springing further to the north changes to a waterlogged slough without flowing water in summer months; therefore, only the other tributary was selected for monitoring. All measurement and sample extraction was always conducted at the outlet facilities of all reservoirs. The ponds are in an immediate vicinity of each other, so we assumed that water flowing out of one reservoir has the same quality as the water flowing in the next reservoir.
We measured 4 criteria (dissolved 0_2, pH, temperature, conductivity) in monthly intervals on the sites using a mobile multimeter HACH LANGE and quarterly we took samples of water and analysed them in the Department of Applied and Landscape Ecology laboratory. All concentrations were established by means of spectrophotometric methods.
Limits of individual indicators stipulated by Appendix no. 3 of Government Decree no. 61/2003 Coll., as amended, are presented in Table 1. Environmental quality norms were used to assess the measurement results.

Results
When the results were compared with the relevant legislation, we found that most of the explored indicators do not reach the limits.
Water temperature in the system of Jinolice ponds depends on the weather, or more specifically air temperature, just as in most small water reservoirs. Summer and winter stratification of water does not occur there due to the small depth. Because water warms up relatively fast, this contributes to the development of eutrophication. Colder water from the tributary of pond Oborský, which has a temperature below 15°C even in a hot summer, does not affect the temperature in the reservoir because the ratio of the incoming water to the water in the reservoir is negligible. In winter, water surface of the pond freezes in dependence on the weather. As the graph in fig. 3 shows, the water temperature value stipulated in Government Decree no. 61/2003, as amended, was not exceeded in any of the sites in the monitored period.
Oxygen comes to water either by diffusion from the atmosphere or during photosynthetic assimilation. Its water solubility is in indirect proportion to the temperature, as shown in fig. 4:
in summer, the content of dissolved oxygen decreases and in colder periods it increases. The effect of organic pollution, or the total mineralization, on the content of dissolved oxygen is negligible. The graph in fig. 4 shows that the reservoir in the lowest position, Vražda, has the lowest content of dissolved oxygen. The reason is its position – it is the last in the row of reservoirs and it accumulates polluting substances from the higher located ponds; these then consume the oxygen for their own oxidation.
In the conditions of the Czech Republic, phosphor is the key element of the eutrophication of surface water. Its origin can be both natural and anthropogenic. The higher occurrence of phosphor in reservoirs Němeček and Vražda (fig. 5) is probably caused by the presence of the subsurface flow constructed wetland, Němeček being its recipient. In March and April, owners of the local refreshment and fast food stands prepare for the season and wash all their equipment. They use various washing up and cleaning agents that can be sources of phosphor. In summer, the concentration of total phosphor decreases due to the fact green water organisms change phosphor in water to organically bound phosphor during photosynthetic assimilation.

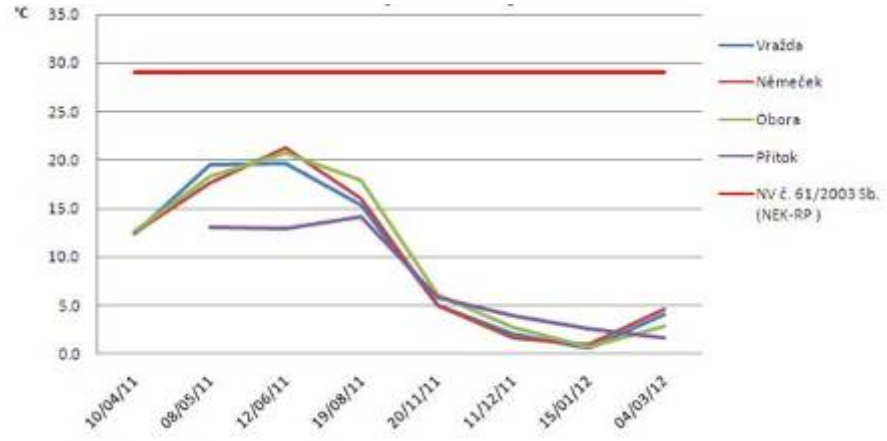

Fig. 3: Water temperature measured by a probe

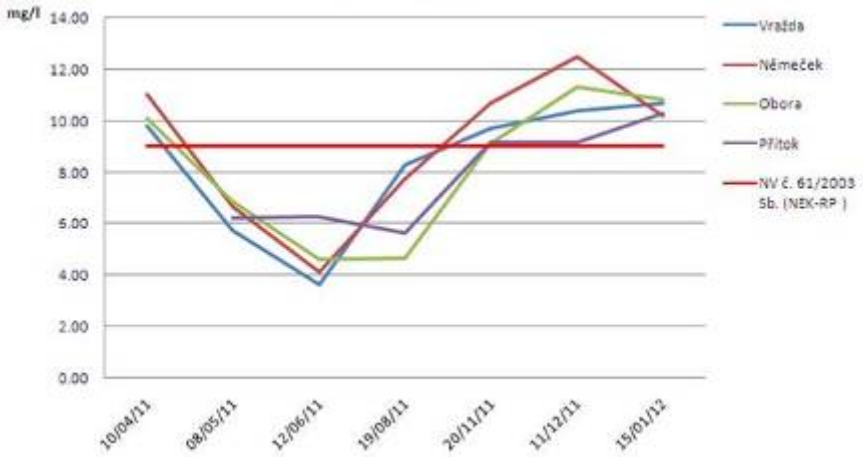

Fig. 4: Concentration of dissolved oxygen measured by a mobile multimeter

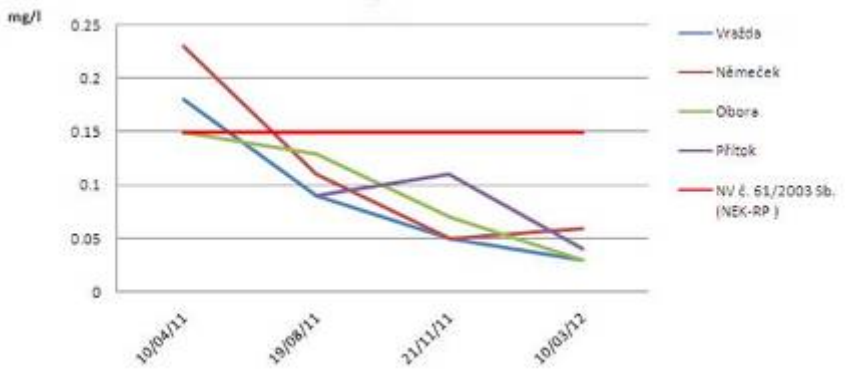

Fig. 5: Concentration of total phosphor established by laboratory

Tab. 1: Environmental quality norms for surface water bodies (Government Decree 61/2003 Coll., as amended)

Indicator	Sign	Unit	NEK	
			NEK-RP (mean)[1)]	NEK-NPH (the highest allowed value)[2)]
dissolved oxygen	O_2	mg/l	>9	
chemical oxygen demand	$CHSK_{Cr}$	mg/l	26	
total phosphor	$P_{celk.}$	mg/l	0.15	
nitrite nitrogen	$N\text{-}NO_2^-$	mg/l		
nitrate nitrogen	$N\text{-}NO_3^-$	mg/l	5.IV	
water temperature	t	°C		29
reakce vody	pH	-	6.IX	
water reaction	Cl^-	mg/l	150	
sulphates	SO_4^{2-}	mg/l	200	
manganese	Mn	mg/l	0.3	
iron	Fe	mg/l	1	

[1)] NEK-RP: environmental quality norm expressed as an annual mean. If not stated otherwise, it is used for the total concentration of all isomers. For each water body, usage of NEK-RP means that the arithmetic mean of the concentrations measured at various times during the year did not exceed the limit in any of representative monitoring points in the water body.

[2)] NEK-NPH: environmental quality norm expressed as the highest allowed value - this must not be exceeded. Unless the NEK-NPK is determined, the highest allowed values are not used.

Discussion and conclusion

Thanks to their location (about 5 km far from Jičín, near the rocks of Prachovské skály), Jinolice ponds are a popular site within the PLA Český ráj. Pond Oborský is intensively used as a natural swimming pool; however, its water often has a higher concentration of chlorophyll and blue-green algae, which reduce its usability for swimming and bathing as early as in June.

The self-cleaning ability of water in the system of Jinolice ponds is considerably reduced by the short time of water retention in the particular reservoirs. This is caused by the small depth of water. Another factor affecting the self-cleaning process is that the particular reservoirs are closely adjacent. Between pond Oborský and pond Němeček, the water does not flow through a free channel where the water could be properly oxidized and where the green plants could improve its quality. The total length (about 20 m) of the connecting stream is tubed. The performed analyses showed that the water in pond Vražda has the highest concentrations of the indicators in many cases. A solution could be a change of water conduction from pond Němeček. Constructing a wetland from a belt of woody plants between the two lower reservoirs, where wetland vegetation would grow and water could spill into a larger area instead of going through a chute, would support the self-cleaning ability and could thus improve the quality of water coming into the last reservoir – a part of Natural Monument Vražda.

Jinolice ponds have always been very intensively used, mainly for leisure and sport fishing. Both of these activities demand a good water quality; on the other hand, they both make it worse. The biggest problem here, just as in other reservoirs, is eutrophication, which has to be battled against so that the biodiversity of animal and plant species related to these water ecosystems is maintained.

Practically all of the selected indicators have been found within the limits of values stipulated by valid legal regulations, except for oxygen, whose values decrease under the set limit in hot summer months. However, this phenomenon is quite natural and common in most reservoirs of the Czech Republic.
As has been assumed, leisure activities and the related services contribute to the deteriorated quality of water to the highest extent. For many, pond Oborský is mainly a natural swimming pool. Its usage cannot be reduced but the quality of the inflowing water should be emphasized (protection of the spring area) and conditions for running camps should be met.
Pond Němeček is influenced the most by the subsurface flow constructed wetland, whose bad condition contributes to the deterioration of water quality. The last of the reservoir system, pond Vražda, has the worst water quality, although it was pronounced a natural monument and more emphasis should be put on its water quality. Pollution from the reservoirs located above accumulates in this pond; therefore, it is necessary to reduce the pollution and support the self-cleaning processes in the water of the entire system. Currently, the self-cleaning processes are not able to improve the water quality.

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ENVIRONMENTAL IMPACT ASSESSMENT PROCESS IN THE V4 COUNTRIES IN THE FIELD OF RECREATION AND TOURISM

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Abstract

The purpose of this article is to present issues related to the process of environmental impact assessment carried out for sport, recreation and tourist facilities in the V4 countries. The results represent data obtained during the survey carried out as a part of the international project "Assessment of the quality of the environment in the V4 Countries (AQE V4)" Standard Grant IVF 21210018 supported by the International Visegrad Fund partners from the V4 countries: Poland, Slovakia, the Czech Republic and Hungary. The analysis of the survey responses indicates that there are significant differences in the process of qualification of such objects for the EIA which also results in differences in the number of reports made and the methods used for evaluation. Among the V4 countries which have been analysed, Poland seems to be the most distinctive, as its regulations appear to be the most liberal.

Key words: assessment, environmental, impact, recreation, tourism

Introduction

The obligation to carry out an environmental impact assessment (further "EIA") is based on Article 2 of the Council Directive 85/337/EEC of 27 June 1985 on the assessment of the impact of certain public and private undertakings on the environment. The original Directive of 1985 and its three amendments were codified by the Directive 2011/92/EU of 13 December 2011 (further "EIA Directive"). The member states must take all necessary measures to ensure that undertakings which might have significant effects on the environment, because of their nature, size or location must obtain a development consent and an assessment of the environmental impact, made prior to obtaining the consent (Wytyczne, 2009).

The purpose of this article is to present issues related to the process of environmental impact assessment carried out for sport, recreation and tourist facilities in the V4 countries. The results represent data obtained during the survey carried out as a part of the international project "Assessment of the quality of the environment in the V4 Countries (AQE V4)" Standard Grant IVF 21210018 supported by the International Visegrad Fund partners from the V4 countries: Poland, Slovakia, the Czech Republic and Hungary. Selected responses of all the survey respondents and the respondents who indicated that they had been preparing a report on the environmental impact of a given undertaking (further "report") in the field of sport, recreation and tourist facilities (SRTF) in the following countries: Poland, Slovakia and the Czech Republic have been compared in this work.

The EIA process is regulated in each V4 country by the following acts:

- In Poland: Act of 3.10.2008 on the Provision of Information on the Environment and its Protection, Public Participation in the Environmental Protection and Environmental Impact Assessments (Journal of Laws No. 199, item 1227), the Act on the EIA; The Regulation of the Council of Ministers of 9.11.2010 on types of projects likely to have a significant impact on the environment (Journal of Laws No. 213, item 1397),
- In Slovakia: Law No. 24/2006 Coll. on environmental impact assessment,
- In the Czech Republic: Act No. 100/2001 Coll. on environmental impact assessment,
- In the Hungary: Government Decree No. 314/2005 (XII. 25.) on environmental impact assessment and the integrated environmental permit.

During the process of qualification, the undertakings which require assessment of the impact, the types of the undertakings for which EIA is mandatory – Group I (Annex I of the EIA Directive) and for which it may be required were identified Group II (Annex II of the EIA Directive). For the latter, it is necessary to carry out a diagnosis (screening), selection at the initial stage, whether the undertaking from the group II should be the subject to EIA.

The screening is based on the individual study and / or checking the threshold values or criteria set by a given country (Wytyczne, 2009).
Undertakings in the field of SRTF were in all analysed countries qualified as the ones belonging to the Group II and divided into the same types. Differences appear in the screening of particular types, as the criteria used in each country vary and it results in other threshold values (Table 1).

Tab. 1: List of undertakings which require screening when carrying out the process of EIA in the field of SRTF, together with the indication of threshold values in each V4 member country– simplified, column (A) - the threshold values, column (B) - the individual study (EIA Directive, Act of 3.10.2008, The Regulation of the Council of Ministers of 9.11.2010, Law No. 24/2006, Act No. 100/2001).

Undertakings	PL		SK		CZ	
	(A)	(B)	(A)	(B)	(A)	(B)
Construction of recreational and hotel complexes and related facilities	with gross covered area not smaller than: a) 0.5 hectares in areas with nature protection zones and buffer zones of the protected areas, b) 2 ha in areas other than those mentioned in point a.		over 500 accom. places inside urban area and no limit outside urban area		an area >1 ha	
Ports for water sports (including moles, storage premises, repair facilities etc)		X	to 100 places for vessels			
Recreational ports for yachts and small boats	for not less than 10 vessels, using the length of a coastline <20 m;			X		X
Downhill ski courses, cross-country ski courses, ski-lifts, ski-jumps, cable lines and other facilities		X		X		X
Permanent race tracks and testing tracks for motor vehicles				X		
Construction of sport, golf courses and related facilities		X	from 5000 m^2 to 2 000 m^2		an area >1 ha	
Theme parks		X		X	an area >5 000 m^2	
Permanent camp sites and caravan sites	an area of land under development not smaller than 0.5 ha			X	over 50 accom. places	

1. if the planned undertakings are located in protected areas, the screening stage has stricter thresholds values,
2. if the planned undertakings are located in protected areas it is mandatory to prepare a report on the impact of the undertaking on the environment,
3. if the planned undertakings are located in protected areas, then for the screening stage the threshold data do not apply.

In Slovakia, EIA is mandatory for certain types of undertakings belonging to the Group II. For such projects as: recreation centres, hotels and ski centres it is required to carry out EIA if they are located in protected areas (Tab. 1). In Poland and the Czech Republic, screening is compulsory in such situation.

Also, threshold and exclusion criteria which allow not to carry out EIA have various characters and values (Table 1). For example, for the above mentioned hotels and holiday centres in Poland and the Czech Republic, the threshold value is the gross covered area equal to 2 ha and 1 ha, respectively, while in Slovakia it is the number of beds 500 and 50 depending on the type of the building.
Exceptions include enterprises located in Natura 2000 areas, where the screening process is always required.

Methodology

The first step was a joint preparation of the questionnaire by all partners involved in the project. The final version of the questionnaire consist 20 questions: single and multiple choice answers and comments. The last two questions were dedicated to obtaining a respondents' answer or suggestion concerning improvement of the efficiency of the EIA process and comments, as well as suggestions on the problem. List of the potential respondents of the survey was based on available databases related to the EIA process in the project partners' countries. The online surveys have been implemented simultaneously in four countries from January to February 2013. About 200 potential respondents from each country were invited via e-mail to take part in e-survey and we have expected 50 responses. The invited respondents completed the questionnaire placed on the project website and the answers were anonymously sent to the e-mail addresses of the national coordinators of the project.

Currently an analysis and evaluation of the results is being carried on. The results from all V4 countries will be described and compared.

Results

Partial results present general information about the EIA process, similarities and differences in methods of implementation and understanding of the process in all V4 countries. The results show the comparison of answers to selected questions received from all respondents of the survey and the respondents who indicated that they had prepared a report on the impact of projects in the field of SRTF for the following countries: Poland (PL), Slovakia (SK) and the Czech Republic (CZ).

On the basis of the survey results, a preliminary analysis of selected question has been carried out:

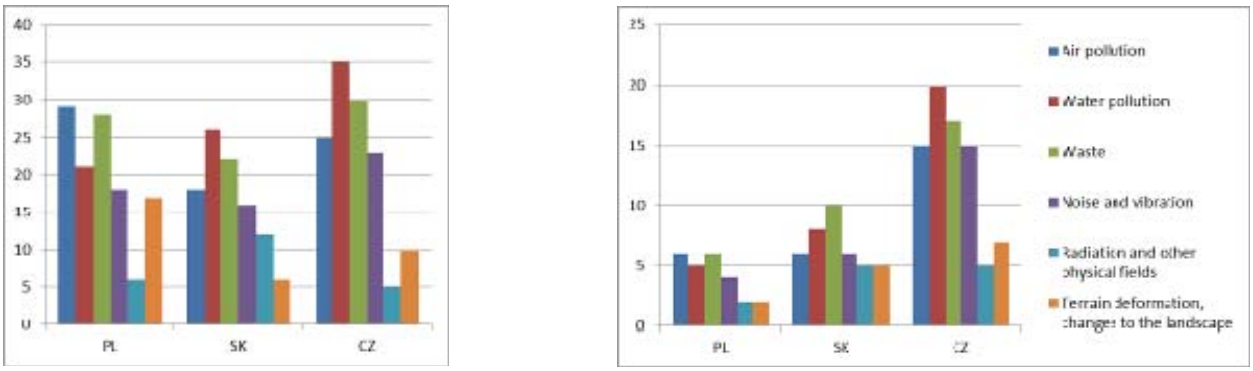
- In which sectors (of industry) do you have experience of EIA preparation? (Tab. 2);
- Which of the following stressors in the implementation of the EIA process do you specialize in? (Fig. 1);
- What procedures and methods do you use for identification and assessment of impacts? (Tab. 3).

The obtained responses (Table 2) show that in all countries, respondents most often (at the first five places) prepare EIA reports in the fields of infrastructure and also transport and telecommunication, then the further ones are: energy industry (in Poland and in Slovakia) sport, recreation and tourist facilities (in Slovakia and in the Czech Republic), water policy (in Poland and in Slovakia) and finally strategic impact assessment in the field of planning and strategic documents also appears among the top six places in all V4 countries.
The field of SRTF analysed for the purpose of the paper in Slovakia and the Czech Republic was placed at the third and the second place respectively. However, in Poland, a report on the impact of undertakings in the field has not been often drawn up because only 8 of 50 respondents indicated that they had prepared such reports. In Slovakia – there were 17 and in the Czech Republic 27 respondents respectively. Such differences may result from an individual approach to the screening, threshold values and criteria excluding or triggering the need for EIA preparation in each countries.
Reports on the impact in the field of military construction have been the least frequently prepared (1-3 selected response).

Tab. 2: Respondents' answers to the question: „In which sectors (of industry) do you have experience of EIA preparation?", starting from the highest to the lowest values, the colours mark the positions obtained by the field of SRTF.

item	PL	SK	CZ
1.	Energy industry	Infrastructure	Infrastructure
2.	Infrastructure	Energy industry	Purpose-built facilities for sport, recreation and tourism
3.	Water	Purpose-built facilities for sport, recreation and tourism	Transport and telecommunications
4.	Transport and telecommunications	Water	Mining industry
5.	Strategy documents	Transport and telecommunications	Planning documentation
6.	Planning documentation	Planning documentation	Mechanical and electrical engineering
7.	Other industries	Mechanical and electrical engineering	Other industries
8.	Food industry	Agricultural and forest production	Agricultural and forest production
9.	Mining industry	Chemical, pharmaceutical and petrochemical industry	Chemical, pharmaceutical and petrochemical industry
10.	Wood, pulp and paper industry	Other industries	Energy industry
11.	Industry of building materials	Mining industry	Water
12.	Chemical, pharmaceutical and petrochemical industry	Strategy documents	Strategy documents
13.	Agricultural and forest production	Industry of building materials	Industry of building materials
14.	Metallurgical industry	Wood, pulp and paper industry	Food industry
15.	Mechanical and electrical engineering	Metallurgical industry	Wood, pulp and paper industry
16.	Purpose-built facilities for sport, recreation and tourism	Food industry	Metallurgical industry
17.	Military construction	Military construction	Military construction

On the basis of the results (Fig. 1A), similarities in response concerning types of emissions which the respondents specialise in when dealing with the EIA project, can be observed in all V4 countries. They include emission of pollution to air and water and waste production. In Poland and the Czech Republic, the least of the interviewees specialise in emission of radiation and other physical fields, in Slovakia land deformation and landscape changes are the least popular (Gałaś S. et al., 2013). The same situation can be observed in the analysis of the responses of those respondents only who were engaged in the field of SRTF (Fig. 1B), apart from a small variation in Slovakia, where in that case, the answers related to generation of waste and air pollution have changed places.
Comparing the obtained responses of all respondents separately in each V4 member country (Table 3), certain varieties concerning the choice of the methods applied to identify and assess the impact of undertakings on the environment can be observed. In Poland, they are mainly: Forecasting methods, Environmental indicators, Multi-criteria assessment and Matrix. In Slovakia, the highest positions are occupied by the following methods: Methods Ad hoc, Matrix, Checklists and Mapping overlay. In the Czech Republic, the most widely used ones are: Environmental indicators, Multi-criteria assessment, Mapping overlay and Methods Ad hoc. Similar methods have been most often chosen in all V4 countries respectively by the authors of studies on sport, recreation and tourist facilities.



(1A) **(1B)**

Fig. 1: Respondent's answers to question: Which of the following stressors in the implementation of the EIA process do you specialize in? The comparison of answers to selected questions received from all respondents of the survey (1A) and the respondents who indicated the field of SRTF (1B).

However, when analysing the responses it can be concluded that the Forecasting methods, which is so popular in Poland, is applied occasionally in Slovakia and the Czech Republic. And just the opposite, the Methods Ad hoc so frequently used in those countries is rarely used in Poland. The Method of Networks and system diagrams is the least frequently applied method in the EIA process in all of the analysed countries (2-8 of the selected response).

Tab. 3: Respondent's answers to question: What procedures and methods do you use for identification and assessment of impacts? The comparison of answers to selected questions received from all respondents of the survey - column (A) and the respondents who indicated the field of SRTF - column (B), starting from the highest to the lowest values.

item	PL		SK		CZ	
	(A)	(B)	(A)	(B)	(A)	(B)
1.	Forecasting methods	Matrix	Methods Ad hoc	Methods Ad hoc	Environmen. indicators	Environment. indicators
2.	Environmen. indicators	Forecasting methods	Matrix	Matrix	Multicriteria assessment	Multicriteria assessment
3.	Multicriteria assessment	Environmen. indicators	Checklists	Mapping overlay	Mapping overlay	Mapping overlay
4.	Matrix	Multicriteria assessment	Mapping overlay	Checklists	Methods Ad hoc	Methods Ad hoc
5.	Mapping overlay	Checklists	Multicriteria assessment	Multicriteria assessment	Forecasting methods	Forecasting methods
6.	Checklists	Mapping overlay	Environmen. indicators	Environmen. indicators	Checklists	Checklists
7.	Methods Ad hoc	Networks	Forecasting methods	Forecasting methods	Matrix	Matrix
8.	Networks	Methods Ad hoc	Networks	Networks	Networks	Networks

Conclusions

It is difficult to explain explicitly the differences in EIA procedures in the field of sport, recreation and tourist facilities in the analysed countries. Especially their small share among the studies carried out by the survey respondents in Poland is significantly different when compared to all other countries. Polish regulations cause that such objects less frequently than elsewhere are the subject to the EIA procedure. Such undertakings usually do not cause any threat to

particular environmental resources. Hence, they are rarely negatively perceived by local communities which strongly react in case of other proposed investments, for example such as mining ones. Therefore, the authorities related to the environment more frequently, than in other cases, decide at the screening stage that it is not necessary to carry out the EIA procedure. However, such objects are often located in areas of high natural value. If the undertakings occur to be in the areas which are legally protected (national parks, nature reserves, Natura 2000, etc.), there are clear limitations and rules that should be respected in such cases. In Poland, recreation and tourism are often recommended as the direction of economic development to the local authorities. Tourist and recreational facilities are simply associated with easy economic benefit. Therefore, investment pressure in this field focused on valuable natural areas can be a serious threat to their values and integrity. The survey results may indicate a different approach to this issue in different countries.
The above conclusions should be considered preliminary. Comprehensive results of the survey will be compared in V4 countries and will be available on the project website: www.environ.agh.edu.pl and upcoming book after analysis, which main goal is to support the EIA in the V4 countries. The project will also include preparation of a lexicon of basic EIA terms in 5 languages.

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EVALUATION OF LANDSCAPE SEGMENTS USING DECISION-SUPPORT SYSTEMS

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Abstract
The aim of the papers is describe the role of GIS in relation to decision-making and expert systems, and its key elements. Spatial Decision Support Systems are closely related to knowledge-based and expert systems whose creation was possible due to artificial intelligence. They are considered a sub-category of knowledge-bases systems. For the application of GIS in the SDSS it is specific that, in addition to building a data structure, which is the primary reason for deployment, significantly applied and specific methods for determining their own GIS technology.
The designed system enables a multidisciplinary view of a landscape. The SDSS system is beneficial for these two aspects: i) determining all four relations from minimum consistent data at the same time, ii) formalised marking of reclassifying, assigning coefficients and ascribing weights to the factors. Thanks to the documented methodologies for data preparation, development of particular dependency networks and assessment procedure in EMDS, the expert system can be also used for other areas of interest.

Key words: EMDS, decision support, expert's system, GIS, landscape ecology

Decision-support systems and GIS

Decision Support Systems (DSS) enable application of analytical and scientific methods in decision-making process. After [1], [5], [29] DSS is as a group of programmes that support decision-making. Originally, these systems were intended for financial planning where they were to become means for making estimates and evaluation of hypothetical development scenarios. Using six attributes to identify DSS i) DSS are directly designed to solve problems difficult to structure; ii) they represent an efficient and user-friendly environment; iii) they are able to examine accessible solutions by creating alternatives; iv)they enable interactive and recursive solution; v) they are able to flexibly combine analytical models and data; vi) the system uses more decision-making methods [6].
Spatial Decision Support Systems (SDSS) are a special type of information system. There is no unambiguous and generally accepted definition because forms of technology have not been profiled yet [5]. However, the majority of authors agree that it is a spatial expansion of DSS, or rather an integration of GIS and DSS [6], [8]. Computer information systems that provide support for problems difficult to formulate and structure and cases when it is impossible to use a fully automated system are usually considered SDSS. SDSS are closely related to knowledge-based and expert systems whose creation was possible due to artificial intelligence. SDSS as a spatial expansion of DSS have four further attributes [23]: i) they provide a mechanism for entry of spatial data; ii) they enable representation of spatial relations and structures; iii) they include analytical means for spatial and geographical analyses; iv) they enable creation of spatial outputs, as well as maps.
Expert systems are computer programmes able to simulate actions of an expert in a particular field when solving complicated tasks. They are considered a sub-category of knowledge-bases systems [5], [29]. They are based on symbolic representation of knowledge and its implementation in an inference mechanism. Experts in the given field present the source of knowledge and procedures. These systems are able to justify solution procedures. They are used primarily for tasks difficult to structure and algorithmize, e.g. problems with recognition of situations, diagnosis of status, construction, planning, monitoring of status, corrections, management and decision-making. However, experience and intuition have to be part of the solution.

Role of GIS

Using GIS and SDSS has a characteristic feature: except for creating data structure, which tends to be the primary reason for deployment, specific decision-making methods are applied [4], [13]. According to [22] there are two basic categories of perceiving and using GIS as a tool for decision support :
GIS is used for better decision support because it helps assemble, organise, analyse and appropriately visualize data used for problem solving by the user. When making a decision on

the suitability of solution it is possible to make use of alternative scenarios and then compare their decisive parameters.
GIS is relatively amply used in solving specific SDSS tasks oriented at location and allocation problems, as well as in network analyses.
Other authors also mention a similar view of GIS and SDSS. For example states that each GIS helps the user to perform better explanation or justification of his decision [8], [11]. However, at the same time, he sees a problem in lack of interconnection between GIS and decision-making methods in narrower sense. He perceives GIS as a means for interconnection of data bases with management processes and says that the spatial character of GIS makes it a system suitable for identification of various phenomena dependent on geographical space. It is three ways in which GIS can be used in a decision-making process [14]:

4. GIS enables representation of problem in graphical/spatial form, thus leading to a more elegant solution of the given problem.
5. Using GIS changes our perception of the world and makes us realise the spatial context.
6. GIS as a strong tool of information processing can also be deceptive (intentionally, or not) by representing things that do not exist.

Systems for spatial decisions are applied in a number of different fields, especially in applied biological sciences. GIS application during decision support in relation to natural resources management: identification of areas meeting certain conditions - e.g. areas with dead trees [12]; [18], [20] identification of various phenomena dependent on space [21], [26], e.g. impact of spatial margins on the inner space area, possibilities of origin of buffer zones around polygons; prediction models – e.g. species composition [15], [16], [19]; models of fire probability, probability of undesirable impact of climate, etc.; spatial process analyses; e.g. characterisation of spatial variability of ecological phenomena[28]; a number of interesting studies using GIS as the basic component of SDSS appear in hydrological applications [17], [27]. The extent of involvement of GIS is variable, from external environment for occasional analyses, through thematic application expansion to independent complicated hydrological, or hydrometeorological simulation models.

Two levels of SDSS
On a general level GIS sufficiently fulfils requirements for decision support tools. However, this allegation has to be specified; do we speak about decision support in broader or narrower sense? Decision support in broader sense stands for a tool for efficient work with a high amount of miscellaneous data that has to be analysed and represented quickly and efficiently in order to be able to make quick decisions. For this type of support the current GIS offers extensive possibilities and tools for mutual combinations of data of different nature with relation to a certain geographical space, and their analyses [17]. At the same time GIS provides wide-ranging tools for presentation of data, suggestions, scenarios and results, most often in the form of a map or 3D animation. Visual interpretation of information significantly facilitates orientation in a high number of data and provides the possibility of structured expression of the monitored aspects [4]. The most significant here are the programme's cartographic possibilities to create thematic maps and the possibilities of user adaptation of the programme. Therefore, users appreciate a strong tool with intuitive handling like ArcGIS and its supplements by third parties. Nevertheless, we must emphasize here that the possibility of easy handling without deeper knowledge of processes and algorithms may lead to a completely incorrect interpretation of results, and thus, erroneous decisions [13].
In case of decision support in narrower sense, i.e. real DSS tools, the situation is different. There are few GIS programmes with implemented DSS tools, or rather only the IDRISI system can be included in this group [8]. Another programme with suitably implemented DSS tools is the EMDS system stipulated as an optional supplement (extension) of ESRI products. These tools require deep knowledge of the issue and their handling is not so user-friendly. Performing analyses is more time-consuming and often there is not much time for such an operation. Therefore, theses analyses are used rather in expert studies and scientific work. Low diffusion of these tools is also caused by plain interface of programmes and complicated integration with common programme packages. A positive element leading to quicker integration of DSS tools is the ability to automate processes, retain and share decision-making patterns and modify only input parameters.

Ecosystem Management Decision Support (EMDS)

According to [24] EMDS integrates logical formalism justified on the basis of knowledge base in the GIS environment so that it provides support for decisions on evaluation and assessment of landscape from ecological point of view. The EMDS decision-making pattern is based on a knowledge base that uses fuzzy logic, network architecture and object-based approach. The basic architecture of objects of EMDS knowledge bases enables increase in development of dependent complicated knowledge data. Up-to-date modern research methods dispose of mathematical models characterised by very specific mathematical dependencies between the status of monitored objects and the processes influencing them. Fuzzy logic tools significantly enhance the ability to work with incomplete information. The proposed network architecture of EMDS knowledge bases allows evaluation of the influence of the missing information and has the ability to come to conclusions with incomplete information. When it is interconnected with ArcGIS we get a full SDSS product.

The EMDS system consists of three main parts. Application extension for the integration of EMDS into the ArcGIS environment – provides a system of objects and methods for processing of knowledge bases in GIS applications. Enables the creation of a data catalogue, selection of area of interest, search of geographical attributes and visualisation of analysis results in the form of maps, tables and graphs. In the EMDS environment the user designs information layers that include all GIS themes entering the assessment and performs their assessment. Advantages of the architecture used themes included in assessment, relations between statuses and processes in knowledge base, and sources of data are fully set by the user, who therefore has the possibility to control the definition of the problem; knowledge base developed for one area is easily adapted to another area and assessment requirement can be determined generally for a big region, and then can be easily modified for a specific subregion.

The Assessment system is a graphical user interface for NetWeaver that enables users of the EMDS application control setting and launching of analyses, directly edit knowledge base, display maps, tables and graphs, and evaluate the status of knowledge bases in relation to the analyses performed.

NewWeaver development system that is designated for creation of knowledge base. NetWeaver is the example of a modern tool for creation of knowledge base in space-oriented applications. NetWeaver knowledge bases use an object-based approach, which makes them very modular, therefore, they are easily created and maintained. Moreover, the system enables interactive tuning in an arbitrary stage of the creation of the knowledge base. This significantly speeds up the development process. Fuzzy logic provides calculation methods which do not require directive expression. NetWeaver is a 100% object-oriented system. This means that networks and data links are programming objects that represent or substitute objects or notions of the real world. Objects are defined as carriers of information with a certain status. One and the same object can react to maintenance differently at different times [7]. Data links typically require data about real objects like e.g. age and assessment of forest stand. Dependency networks represent more abstract objects like e.g. description of suitability of a biotope for deer assessed by simple abstract data and notions. According to whether objects are programmed by the user or pre-defined we distinguish the following [25]. NetWeaver enables only the creation of knowledge bases. Their usage is enabled by the EMDS system.

Case study: Landscape assessment based upon an expert system

Study area - The Trkmanka catchment area lies in the Carpathian part of the Czech Republic. It consists of the flysh belt of the outer part of the Western Carpathians and the Vienna Basin. As apparent from the map on the following page, this narrow territory drops from the north-east to the south-west. Its area is approx. 380 km2 [18].

Data and methodology

The landscape assessment using the expert system based upon EMDS consists of several parts, in particular that represented by an algorithm based decision scheme for landscape segment assessment, i.e. the designed network in NetWeaver. In addition, a knowledge base on a landscape is set up and fed with data. This involves interconnecting the assessment network with the landscape input data via data links in the network [2], [3]. For this an optimal data model must be designed with a series of reclassification tables enabling the user to adjust the data into an optimal data structure.[4]. The last step is the landscape segments assessment via the designed networks in the Assessment system and display of the results in EMDS.

The assessment goes upon data in the ESRI shapefile format. It can be carried out with a few generally not available data (land utilisation, biotope mapping in the CR by NATURA 2000 methodology, a layer of ecological land units, forest typology and contour lines) that is gradually processed into the required structure and assessed using the Assessment system in EMDS. Similarly it is possible to process partial changes, such as to replace the existing shapefile with constant values of the USLE factors with an input layer with several values.

Results

The designed expert system enables a multidisciplinary view of a landscape being assessed from the four given viewpoints by the chosen methodologies. Thanks to the documented methodologies for data preparation, development of particular dependency networks and assessment procedure in EMDS, the expert system can be also used for other areas of interest. The used methods of assessment have been known for some time and occasionally used for GIS. The expert system is beneficial for these two aspects: a) determining all 4 relations from minimum consistent data at the same time, b) formalised marking of reclassifying, assigning coefficients and ascribing weights to the factors.

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EVALUATION OF SMALL WATER RESERVOIR USE THROUGH ITS QUANTITATIVE AND QUALITATIVE CHARACTERISTICS

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Abstract
The water bodies provided by many reservoirs often allow some recreational uses such as fishing, boating, and other activities. Special rules may apply for the safety of the public and to protect the quality of the water and the ecology of the surrounding area.
Small water reservoirs are essential elements of an agricultural landscape. From natural, hydrological and economic point of view they play many important functions. The important problem of small water reservoirs in water management is their siltation with sediments originated predominantly through water erosion.
The paper deals with an assessment of qualitative and quantitative characteristics of water and bottom sediments in the Klusov small water reservoir, situated in Bardejov district, Slovakia. This reservoir was built for fishing, irrigations, recreation and for retention of high water

Key words: Sediment, siltation, water quality, nutrient

Introduction
Most reservoirs in the world, from small to medium to large capacity, are subject to siltation problems to some degree. It was evaluated that the storage capacity of the world's reservoirs is reducing annually by more than 1 % due to siltation [1]. One of the major factors affecting the proportion of sediment deposition in reservoir is soil erosion in the catchment. Besides quantity, quality of sediment affects downstream areas and thus the water quality. Clean water provides many beneficial uses of waterways and reservoirs, which include swimming, fishing, and the protection of aquatic life.
Monitoring water quality is one way of assessing watershed conditions and the effectiveness of regulatory and management efforts. A combination of geographic knowledge of your watershed, identification of the roles of influential drivers and processes (e.g., water diversions, storms, urbanization, agriculture), and measurements of water and sediment quality can provide a good indication of conditions and potential risks to your watershed [2].

Material and methods
Study area description
An evaluation of qualitative and quantitative characteristics of water and bottom sediments was conducted in the Klusov small water reservoir, which is situated in the Tisovec stream catchment in Bardejov district, Eastern Slovakia. The area of this catchment is about 6.0 km^2 with annual average discharge 0.045 m^3/s and it falls in the Topla partial river basin. The Klusov reservoir was built for fishing, irrigations, recreation and for retention of high water and its basic attributes are shown in Tab. 1 [3].

Tab. 1: Basic attributes of the Klusov small water reservoir

Altitude [m above SL]	Q_{100} [$m^3.s^{-1}$]	Surface area [ha]	Depth of reservoir [m]		Total capacity of reservoir [m^3]		
			average	max.	dead storage	storage	retention
343.00	32	2.20	3.50	9.57	72,188		
					1,215	60,370	10,603

The average annual rainfall is about 670 mm, with maximum in summer months. The mean annual temperature is about 8 °C with a maximum of 20 °C in the month of July and a minimum of -3 °C in January. Majority of land has slope more than 8 %. Soil types of the watershed are, in general, planosols, cambisols and albic luvisols. From the point of soil texture, medium heavy soils (sandy loam) occur in this area. And according to the content of skeleton in the soil, slightly stony soils lead.

The land use of the catchment was found to be mixed type. The upstream part and middle part of the Tisovec catchment is an area mainly covered with forest (39.2 %) and pastures (21.7 %), while the lower part is an arable land (21.4 %) mainly used for cereals (spring barley, winter wheat), corn silage and winter oilseed rape growing. The rest of the land area is for other uses.

The qualitative evaluation of the surface water in the Klusov reservoir

According to the program of reservoir water quality monitoring used by Slovak Water Management Enterprise, the Klusov water reservoir belongs to the orientationally monitored water reservoirs. In 2004, the monitoring of water quality was realized. The results were assessed according to regulations applicable at that time - the Slovak Government Decree 491/2002 code of laws and STN 75 7221 standard [4]. Fifteen indicators of pollution in groups from A (oxygen regime) to C (nutrients) were assessed. Because of representativeness, the water sample was taken by the reservoir dam. In 2008 water sample from Tisovec streams were analyzed for total nitrogen and phosphorus, which were compared with the Slovak Government Decree 296/2005 code of laws.

The quantitative evaluation of the Klusov reservoir bottom sediments

In 2004, together with evaluation of the surface water quality, Slovak Water Management Enterprise realized the siltation measurements of this reservoir. Measurements were carried out through ten cross profiles in a length of 238 meters from the dam (km 0.000) to the inflow (km 0.238) and were realized from the boat using theodolite. The water depth was measured using calibrated rope.

The qualitative evaluation of the Klusov reservoir bottom sediments

In the period from 2004 to 2009 also the quality of reservoir bottom sediments was monitored. The sediment samples for chemical analysis were collected from the drained reservoir. One composite sediment sample was taken from each selected locality – along the reservoir, by the dyke due to deposition of the finest particles [5], which preferentially attached contaminants and in various sampling depths from one locality. Samples were collected to plastic bucket. The weight of the collected composite samples represented about 3 kg. The samples were air dried at room temperature, any coarse lumps were crushed and samples were homogenized. Because this reservoir is situated in the submontane region, mainly affected with nonpoint source pollution from the agricultural production areas, the samples were analyzed for total nitrogen (N), phosphorus (P) and potassium (K). Localities for sediment sampling are shown in Fig. 1. Fig. 2 illustrates the stratification of bottom sediment samples.

Fig. 1: Location of sediment sampling sites

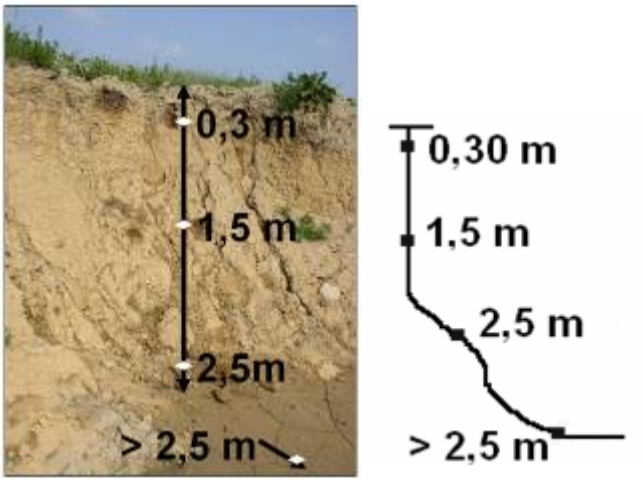

Fig. 2: Stratification of bottom sediment samples (S10-S14, S15-S18, S19-S22)

Bottom sediment samples were analyzed in accredited laboratory of State Geological Institute of Dionyz Stur Spisska Nova Ves. Two composite samples, taken in the reservoir inflow (Si) and near the reservoir dam (Sd), were analyzed according to the Act No. 188/2003 of Code on application of sludge and river bed sediments on agricultural and forest soil [6].

Results and discussion

The characteristics of the Klusov water quality

According to State Standards of water quality [4], the reservoir water (in 2004) belonged to the third class in terms of the dissolved oxygen regime (group A) and basic physico-chemical determinants (group B). In terms of nutrients (group C) water quality showed heavily pollution (IV. class). Since in this catchment no significant point source has been located, it can be state, that the primary source of pollution has been nonpoint source pollution from the agricultural production areas. Concentrations of total N (2.08 mg/l) and total P (0.2 mg/l) in water sample taken from the Tisovec stream accommodated the demands given in the Slovak Government Decree 296/2005 code of laws.

The quantitative evaluation of the Klusov reservoir bottom sediments

Quantities of deposited sediments in reservoir are given in Tab. 2. According to the measuring it was detected that reservoir siltation processes during 19 years (1986-2004) resulted in the reduction of its useful capacity about 33 % [3]. Because this reservoir didn't meet the requirements for its use due to significant siltation, it was drained from 2005 to 2007 what allowed its desilting. We made use of this fact for the sediment collection due to simpler sediment quality monitoring.

Tab. 2: Measurement results of the Klusov reservoir siltation

Year	Watershed area [km^2]	Total reservoir capacity [m^3]	Sediment quantity [m^3]
1986	6,0	72,188	0
2004	6,0	47,680	24,507

The qualitative evaluation of the Klusov reservoir bottom sediments

Chemical analyses of sediment samples taken from drained reservoir analyzed for total nitrogen, phosphorus and potassium are given in Tab. 3.

The chemical analysis results of two samples taken in the reservoir inflow (Si) and near the reservoir dam (Sd) analyzed according to the Act No. 188/2003 are given in Tab. 4.

Tab. 3: Results of bottom sediment chemical analysis in period 2005-2008

sample	N	P	K	sample	N	P	K
	[%]	[%]	[%]		[%]	[%]	[%]
S1	0.260	0.112	2.500	S12	0.240	0.101	2.370
S2	0.240	0.113	2.420	S13	0.250	0.103	2.400
S3	0.230	0.066	1.980	S14	0.250	0.108	2.420
S4	0.220	0.066	1.960	S15	0.150	0.049	1.880
S5	0.220	0.067	1.690	S16	0.160	0.049	1.940
S6	0.200	0.090	2.050	S17	0.160	0.052	1.990
S7	0.170	0.049	2.030	S18	0.180	0.061	2.020
S8	0.160	0.070	1.710	S19	0.170	0.048	2.200
S9	0.110	0.031	1.300	S20	0.160	0.055	2.000
S10	0.230	0.086	2.200	S21	0.170	0.059	2.040
S11	0.230	0.103	2.320	S22	0.190	0.077	2.330

Tab. 4: Chemical analysis of bottom sediments according to Act. No. 188/2003

Parameter	Unit	S_{dam}	S_{inflow}	Limit value (Act No. 188/2003)
Sediment pH	[-]	7.39	7.44	> 5
Dry matter (105°C)	[%]	97.75	98.12	-
Organic matter	[%]	3.01	3.18	-
N	[%]	0.20	0.14	-
P	[%]	0.09	0.07	-
K	[%]	2.05	1.71	-
Mg	[%]	0.77	0.62	-
As	[mg/kg]	9	8	20
Cd	[mg/kg]	< 0.3	< 0.3	10
Cr	[mg/kg]	100	98	1000
Cu	[mg/kg]	25	19	1000
Hg	[mg/kg]	0.09	0.07	10
Ni	[mg/kg]	39	30	300
Pb	[mg/kg]	26	21	750
Zn	[mg/kg]	136	105	2500
AOX*	[mg/kg]	31.3	37.7	500
PCB*	[mg/kg]	< 0.01	< 0.01	0.8
PAU*	[mg/kg]	1.15	0.78	6

AOX* - adsorbable organic halogens
PCB* - polychlorinated bifenyls
PAU* - polyaromatic hydrocarbons

Diverse concentrations of N, P, K in followed sediment samples (Tab. 3, samples S1-S9) confirm irregular sediment deposition in the reservoir. These concentrations increase with proportion of the finest particle fraction and the higher concentrations are by the dam. The chemical analysis results of samples collected from the various sampling depth of the reservoir (Fig. 2) show that the total nitrogen, phosphorus and potassium contents in reservoir sediment samples rise with increasing of the sampling depth. This fact probably corresponds to higher fertilizer application in the high ’80s and low ’90s. After 2000, the trend of consumption of commercial fertilizers is fluctuating with a tendency towards gradual increase.

The high concentrations of total N, P, K adsorbed on bottom sediments influence the water quality through sediment-water interactions, what showed the heavily pollution of water.
The results of chemical analyses given in Tab. 4 showed that hazardous contaminants in sediments don't exceed contaminant levels set by an Act No. 188/2003. The sediments were able to be applied on agricultural land in vicinity of reservoir.

Conclusion

Paper summarizes the evaluation results of the quantitative and qualitative characteristics of the Klusov water reservoir which are important for its use. Based on the water quality monitoring, this reservoir showed heavily pollution in groups of oxygen regime and nutrients. This pollution has been probably attributed to non-point source pollution from agricultural production areas in the vicinity of reservoir, because eroded topsoil particles from these areas bind nutrients, which can significantly affect the balance of the aquatic ecology, resulting in eutrophication. Owing to the high volume of deposited sediments this reservoir didn't meet the requirements for its use. It was drained from 2005 to 2007 what allowed its desilting and revitalization. Because contaminant content in dredged sediments is main factor regarding the sediment as a waste or connected with its direct application on soil according to Act No. 188/2003 the quality of bottom sediments was followed. Study of sediment quality in the Klusov reservoir has shown that hazardous contaminants in sediments didn't exceed contaminant limits set by an Act No. 188/2003 and based on the determination of higher nutrient (N, P, K) concentrations in sediment samples they were able to be applied on agricultural land in vicinity of reservoir. Nowadays (after revitalization) this reservoir meets the requirements for recreational use mainly for fishing.

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FORESTRY – RECREATION AND EDUCATION OBJECTS

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Abstract
The use of rural areas for active recreation and regeneration of physical and mental strength has been intensifying especially in the last 25 years. Especially forests are popular among visitors, because in addition to a healthy environment (silence, clean air, content of fytoncid substances, etc.) we can learn there about natural processes and activities related to forest management. By offering important and attractive objects the number of visitors can be non-violently streamlined and thus the damage of the forest environment can be limited to some extent.

Keywords: Park forests, biotechnology

Introduction

Forests are an integral part of the landscape. They determine its character from lowlands to mountainous areas and provide a wide range of functions, as has been mentioned many times (Kavka-Šindelářová,1978; Supuka-Vreštiak,1984; Poleno,1985; Jurča,1986; Krečmer,1993,1994; Vyskot, 2003 and others). A notable development is seen in the relationship of humans to the forest - from the original predatory approach to contemporary attitudes going towards the ecosystem approach; the emphasis is given on diversified management and related understanding of the functions of forests. Development of transport, often spontaneous construction (particularly commercial-logistic and housing) and other activities require a specific approach to forests, but also to their management. To meet the recreational function of forests it is necessary to create conditions that would satisfy not only the visitors, but also ensure the sustainable development of forests. It is therefore necessary to create a "controlled" recreation - short, everyday, throughout the year, based on the desires of visitors and possibilities of forest managers. Places with modified forest meadows, views of the landscape, springs, etc. can meet such desires and possibilities.
A part of this is also nature trails that make the hiking more pleasant.

Material and Methods

As a model area for the implementation of demonstrative treatment Training Forest Enterprise, Masaryk Forest Krtiny, was chosen. Masaryk Forest is known and recognized not only in the professional world, thanks to the long term pedagogical and scientific research activity, but has also served to the wide public as it offers high standard of leisure facilities and possible activities. The importance of this area consists in the proximity to Brno and Moravian Karst. The availability of public transport (Brno public transport) is highly advantageous. Forests are at an altitude of 210-575 m (in 4 vegetation grades and 116 forest types) and characterize diversity of natural conditions. There are mainly mixed stands, where 46% are coniferous trees and 54% are broadleaved trees. The average annual temperature is 7.5^{o}C and the average annual rainfall reaches 610 mm. The terrain of the TFE Křtiny is very hilly with deep valleys and glens of the Svitava river and the Křtinský stream.
Geological bedrock consists of granodiorite, Culmian greywhackes and limestone. The survey results were the starting point for treatment of vegetation elements in the forest, generalised in creation, management and suburban forests maintenance methodology (Rudolf, 2007).

Results

A conducted survey found the ideas of respondents- forest visitors on the structures which would provide areas for resting as well as sources of cognition and education (Fig. 1):

1) Forests are visited at least once a month by 65.1% of respondents.
2) More than seven tenths of respondents (i.e. 71%) prefer lighter forests, seven tenths (i.e. 69.8%) mixed forests and four fifths (i.e. 80.3%) rather forests with “diversity of sceneries” (it means forests where open and closed areas alternate).

3) More than seven tenths of respondents (i.e. 71%) like natural materials used for leisure elements of forests. The question of preference of particular material was not investigated in the final form of the survey.
4) Almost four fifths of respondents (i.e. 78.2%) would welcome creation of new suburban recreation forests in their area.
5) Interesting opinions came up by answering the question of active approach to Park Forest creation and its maintenance. More than a half of the respondents (i.e. 53.5%) would take the advantage of expressing themselves regarding the new forest creation and they would present their opinion. According to 36.7% probably all of us should be responsible for the maintenance of the forest, according to 13.6% definitely all of us. For instance, according to 24.7% of respondents, a specialized company and people from the neighbourhood should regularly take care of garbage disposal. According to 28.3% of respondents, a specialised company and people from the neighbourhood should take care of the forest equally, according to 11.1%, it should be people from the neighbourhood and just occasionally a specialized company, and in the case of 10.4%, it should be just people from the neighbourhood. A specialized company and particularly people from neighbourhood should take care of the production of birdhouses, feeders, etc. according to 17.9%. According to 34.2%, production of these should be shared by a specialized company and people from the neighbourhood equally; 22.9% of respondents think that mainly people from the neighbourhood and only occasionally a specialized company should be responsible; and according to 16.1% just people from the neighbourhood. (Adapted from Vítková, 2007)

The area of TFE Křtiny was not chosen by accident. The already existent area of forest aesthetics ("Lesnický Slavín", a range of nature trails) is followed by new areas, which emphasize Křtiny as an important pilgrim place and its *genius loci* – "spirit of the place".
In 2002 a study of nature trails Tree Praise was conducted by prof. Otruba. The author was inspired by the intention to "improve the beauty of the forest" and the idea of sensitive insertion of vegetative elements into forest stands in order to sensitively complement them but not transform them.
As a sign of real achievement of interdisciplinary collaboration between foresters and landscape architects this study was further elaborated on by the students of the Faculty of Horticulture in Lednice in close cooperation with the staff of TFE in 2008 and it is being gradually implemented. The layout of the areas and their sequence, including their number, should evoke the Way of the Cross. There are individual stops always devoted to a particular tree genus. The meadows focus on and present the most common genera which a visitor can encounter both in the woods and in parks, or other plantations (birch, hornbeam, larch, maple, fir, oak, poplar, pine, spruce, ash, rowan, lime, beech). The last meadows in front of the Křtiny arboretum is planted with a mixture of exotic woods. Visitors can learn the inexhaustible variety of trees and shrubs, their habit, structure, texture, shapes and sizes of leaves or needles, or their flowers, fruits and seeds. In each area, an information board will be placed from which a visitor will learn important information about the relevant genus.
The plots were planted according to prof. Otruba. The final model was defined by students of the Faculty of Horticulture (Fig 2). The main element of the educative trail is roads (Fig 3) which use the existing forest road network. It also analyses the option of opening up space for the visitors to come as close as possible to the individual taxa and thoroughly get to know the richness of the species and cultivars of trees (with their morphological characteristics, etc.), involving multiple senses (sight, smell, touch). If possible, also wheelchair access is planned. A system of information boards (Fig 4) was designed for individual areas.
At present, planting of selected taxa at individual plots have been largely finished and a proposal of the information system (information boards) and equipment (benches, shelters, etc.) has been elaborated.

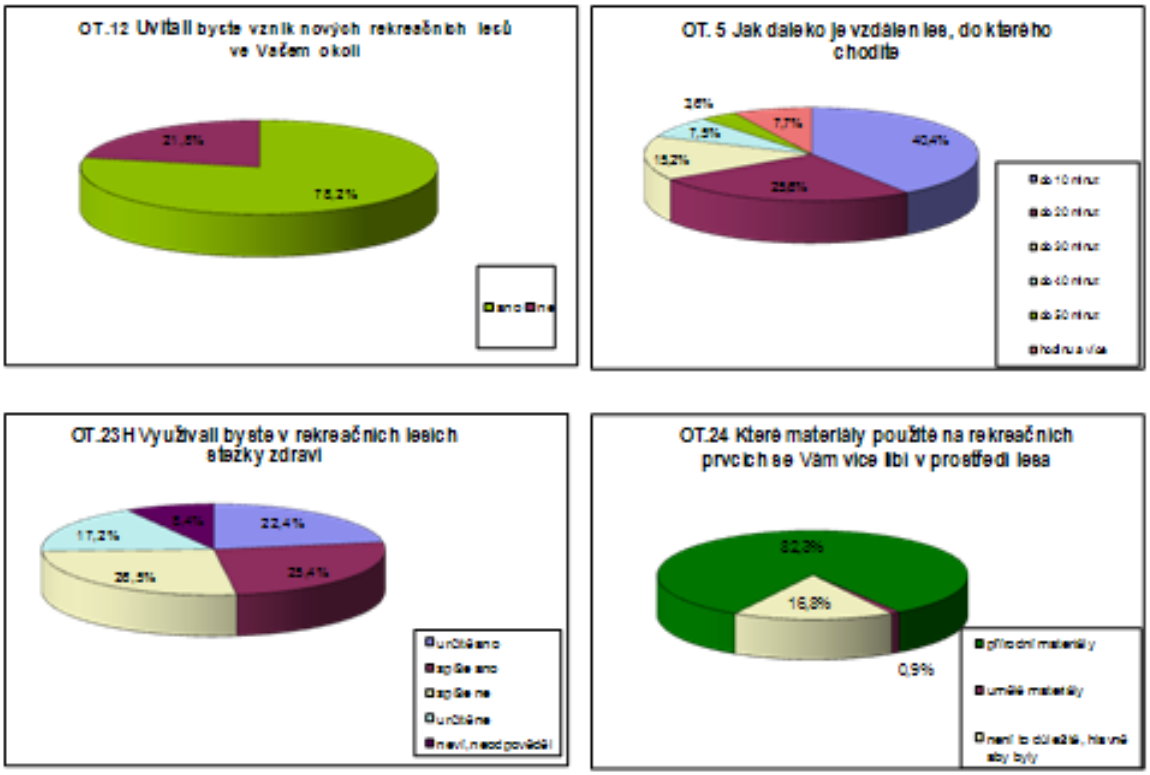

Fig. 1:
OT. 12: Would you welcome a creation of new recreation forests in your surroundings?
OT. 5: How far is the forest where you go?
OT. 23: Would you use trails of health in recreation forests?
OT.24: Which materials used for leisure elements do you like in forests?

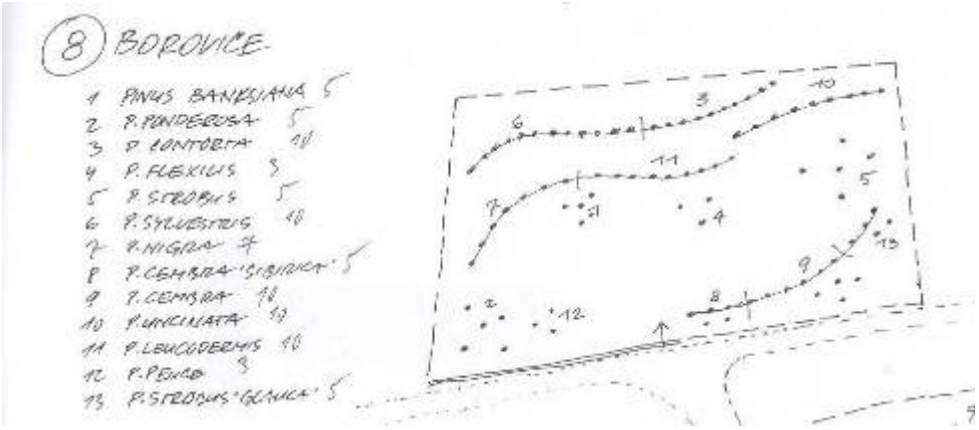

Fig. 2 a: Sample of the planting plan at the area "pine" - The original proposal of prof.Otruba

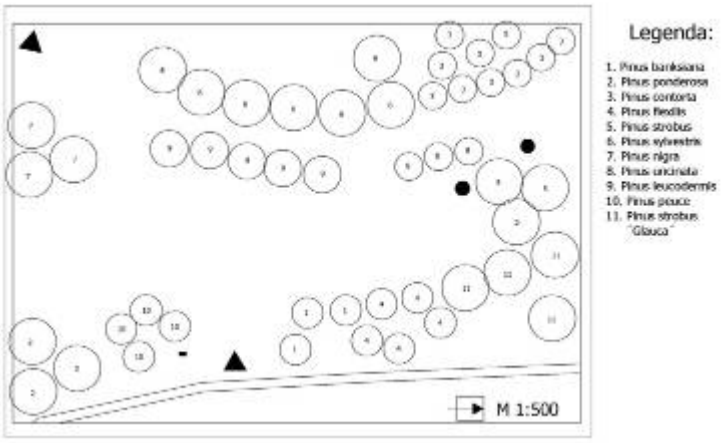

Fig. 2 b: Sample of the planting plan at the area "pine" - Modified and implemented by students

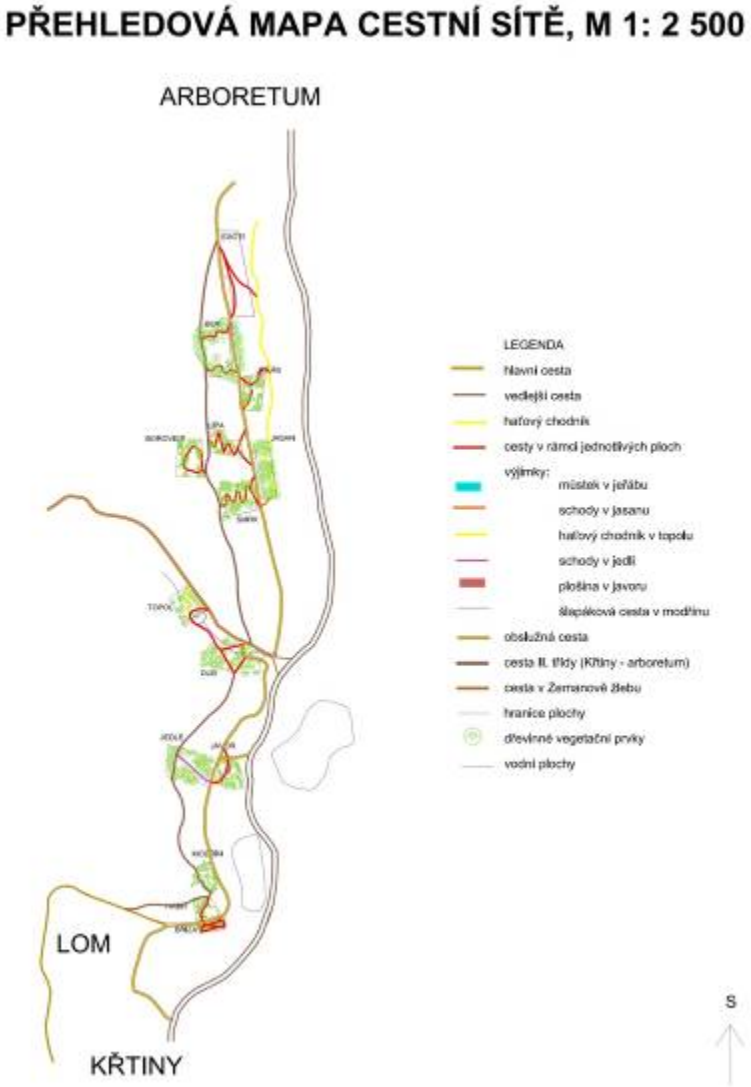

Fig. 3: Map of road network (draft of final version)

Fig. 4: Example of an information board

Discussion

The proposal is based on previous knowledge about the creation, production and facilities of park forests (Supuka-Vreštiak, 1984; Jurča, 1986; Krouml, 1981; Otruba, 2000.2002; Vítková, 2007 and others). Methodological recommendations for biotechnical measures in forests with a prevailing recreational function are very similar in many ways (e.g., both for suburban forests and spa forests). During the process of a nature trail study, parameters of a nature trail were respected (route, information boards), based on a set of methodological recommendations.

Conclusion

Nature Trail Tree Praise complements the known methodology of creation, management and maintenance of suburban recreational forests. The example of the Training Forest Enterprise Masaryk Forest Křtiny, opens other possibilities to cultivate forests on the basis of close cooperation of experts from various fields (forestry, garden and landscape architecture, landscape ecology, conservation, sociology, medicine, etc.). Although this work has not been yet fully completed, the visitors can currently see individual meadows and observe gradual changes in the growth of trees.

Summary

This paper deals with a summary of results from the field of urban recreational forests, urban forestry, and functional use of the forest plus relationship of humans to forest. It is further evident from the survey, how often people visit forests for recreation, what other activities they prefer for recreation, what parts of terrain they prefer for recreation, for which activities they use forests, how far is located the forest they visit, and what feelings they experience while being and moving around the forest. This contribution describes a procedure for the creation, management and maintenance of urban recreational forests and a general proposal of maintenance for model location TFE Křtiny (Training Forest Enterprise Masaryk Forest Křtiny. The proposal contains composition principles, tools for development of urban recreational forests, fundamentals for foundation and maintenance of vegetation elements, processes to get the public involved in the maintenance of the location, and their planning, links to other sources of information and so on.

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CHANGES IN THE QUALITY OF NATURAL WATERS USED FOR RECREATION IN SLOVAKIA

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Abstract
Indicators of bathing water quality in freshwater zones of water have had according to national legislative more strict guidelines values in comparison with Directive on bathing water quality 76/160/EEC. Recently is endangered bathing water quality because of wastewater pollutants from adjacent recreational building. Many private recreational weekend cottages aren't connected to sewerage systems, there is not adequately isolated cesspit and septic, or there is the earth closet close to bathing water locality. Sewage disposal plants, particularly in small villages, they get to required level of cleaning and it constitutes some risks. Source of microbiological pollution in bathing areas are usually also an inflows, which flows through villages where isn't build up the public sewerage system. Bathing water is defined in act number 364/2004 Water Act generally and about the changes in act under National Board of the Slovak republic number 372/1990 about transgression in version advanced regulation (Water Act). Basic requirements about bathing water quality are defined in paragraph 19 Act number 355/2007 about protection, supporting and development the public health. List of bathing waters in Slovak Republic is contained today 34 localities.

Key words: Water quality, natural waters, recreation, legislation, pollution

Introduction

Europeans care about water quality and knowing that they have clean and safe water to swim or play in is an important factor in their choice of a holiday or weekend destination. For the tourism industry, clean and safe water is also a major factor in attracting visitors to an area. To allow Europeans to make an informed choice, the European Environment Agency (EEA) and the European
Commission publishes an annual report on the quality of more than 22 000 bathing sites. In 2012 the report includes sites in all 27 EU Member States and three other countries. This report can help all water users find high quality bathing water across the region.

Material and methods

During the 2004 summer season, in order to ensure public awareness of bathing water quality and the operation of bathing sites, the Public Health Authority of the Slovak Republic compiled information for the media and published articles, aimed both at specialists and at laymen, on the possible health risks of bathing in bodies of water which are not fit for that purpose. Staff of the Environment and Health Unit took part in debates which were broadcast as part of television and radio programs. Up-to-date information on the operation of individual bathing sites and any inadequacies which might be found there were published regularly on the website of the Public Health Office of the Slovak Republic www.uvzsr.sk.
Some new plans designed to protect water resources in the Slovak Republic were drawn up under water protection legislation. At the present time, water protection in the Slovak Republic is covered by Act No 364/2004 Coll. on waters and amending Slovak National Council Act No 372/1990 Coll. on infringements, as amended (the Water Act). In accordance with the Water Act and as required by the Water Framework Directive, the following plans will be drawn up for the Slovak Republic - river basin management plans and the Water Plan for Slovakia, which will include a program of measures for attaining the environmental targets set.
Year 2004 was the first year that Slovakia has reported data on bathing water quality. This was, the year in which Slovakia joined the European Union. The results reported for bathing water quality in freshwater areas was in year 2004 extremely mediocre. The rates of compliance with the mandatory and/or guide values are extremely low, on 22.4% and 14.9% respectively. The high percentage of bathing areas which were not sufficiently sampled (16.4%) was regrettable, since the sampling frequency was clearly defined for each bathing area and does not have to be interpreted with care. This problem was linked to the fact that this is the first time that Slovakia has reported these data to the Commission. List of bathing waters in Slovak Republic was contained in first reporting year 67 localities. These were all natural water locations in Slovakia used by inhabitants for bathing. However, these locations included also

bathing areas with unorganized recreation, thus locations that didn't meet the requirements of the valid legislation on bathing water. Then in next year in 2005 in Slovakia was monitored 39 bathing areas designated as bathing waters, all of them freshwater.

Fig. 1: Map of bathing waters in year 2005 (source: http://ec.europa.eu/environment/water/water-bathing/report_2006.html)

From year 2005 to 2009, there was a strong increase in the percentage of the bathing waters compliant with the mandatory values (2007), an increase in the percentage of the bathing waters compliant with the guide values (2008) and an important decrease of non-compliant bathing waters. In 2010, the bathing water quality decreased especially in terms of the guide water quality. The number of closed bathing waters was the highest in 2004 (17.9 %), but it dropped significantly to 2.8 % since 2008.

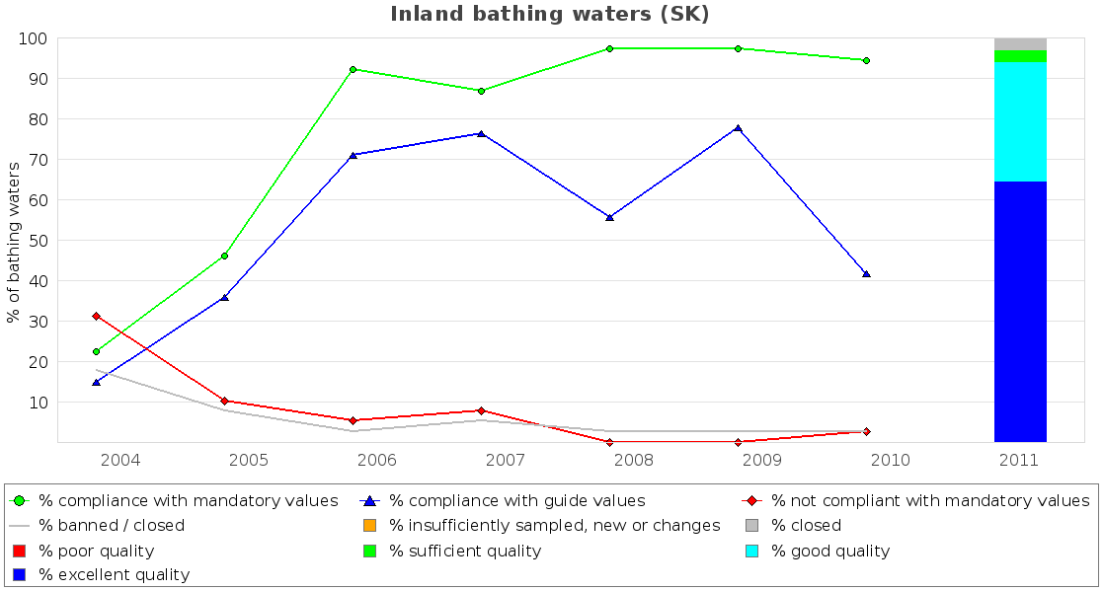

Fig. 2: Results of bathing water quality in Slovakia from 2004 to 2010

Results

By law Nr. 355/2007 L.d. the protection, promotion and development of public health and amending certain acts, each bathing water flowing or standing water, or part thereof, which is used by a large number of people to swim and where bathing is permitted or not prohibited bathing.

Natural swimming pool is reserved for natural surface water and related operational areas with equipment forming an integrated whole. Some selected natural pools, known officially declared water suitable for bathing, are subject to water quality assessment by the European Commission. This does not mean, however, that other natural pools in the SR is not suitable for swimming.

Quality of natural swimming pools must comply with the requirements set by government regulation no. 87/2008 Coll requirements of the natural pools. Rule corresponds to the new European Directive on the management č.2006/7/ES quality of bathing water, which was adopted on 02.15.2006 and specifies the basic requirements for natural bathing waters in the European Union. Directive replaced the previously existing directive no. 76/160/EEC

concerning the quality of bathing water and in the two years since its adoption should be fully transposed into the laws of the Member States of the EU.
To get more detailed information about water quality at their local bathing site, European citizens can find out more by using various online resources such as Eye on Earth. The Eye on Earth global public information service brings together vast amounts of data about the environment in a powerful, visual format. It includes an application called WaterWatch, which allows users to zoom in on their local beach, see previous records and submit their own rating of water quality. These resources are continuously improved and bulit upon, and we urge anyone interested to take a look and make use of them.
Based on the results of sampling for five parameters (total coliforms, faecal coliforms, mineral oils, surface-active substances and phenols), bathing waters are classified into the following classes:
CI: bathing waters that complied with the mandatory values;
CG: bathing waters that complied with the guide values;
NC: bathing waters that did not comply with the mandatory values;
NF: bathing waters that were not sufficiently sampled (frequency criteria not satisfied);
NS: bathing waters that were not sampled due to external causes;
B: bathing waters that were closed or banned.
The new bathing water directive from 2006 (Directive 2006/7/EC) requires that EU member states comply with even stricter requirements and implement effective management of bathing water, public participation and better information dissemination. In accordance with the new directive, by 2012 at the latest, all EU Member States will begin to monitor and report the measured values of concentrations of two microbiological parameters — intestinal enterococci and Escherichia coli — in all bathing waters. Assessment of bathing waters is based on the concentration of these two parameters in the last four years. When less than four years of data are available, the assessment is done under the transition period rules.

Assessment monitoring bathing water is monitored by the Public Health of the Slovak Republic as well as the administrator of the water body. Therefore, the measured values can be compared. Their evaluation is then included in the annual report in the country and also evaluated on the EU website.
We did, on the basis of available data, the evaluation of the measured values for a single location - water reservoir "Teplý vrch." As shown in the following chart limit dissolved oxygen compared with actual values. Below the limit values are repeated in the summer.
Increased temperature naturally heat up the water surface and thus reduce the potential content of oxygen in the water, but also promote the development of planktonic organisms, which reduced the amount of oxygen consumed. Example - the content of dissolved oxygen, in the popular area of Teplý vrch. The resulting oxygen content at saturation of 80 percent was achieved in the period under review again in the month of August. This problem is likely to be repeated in the following years.

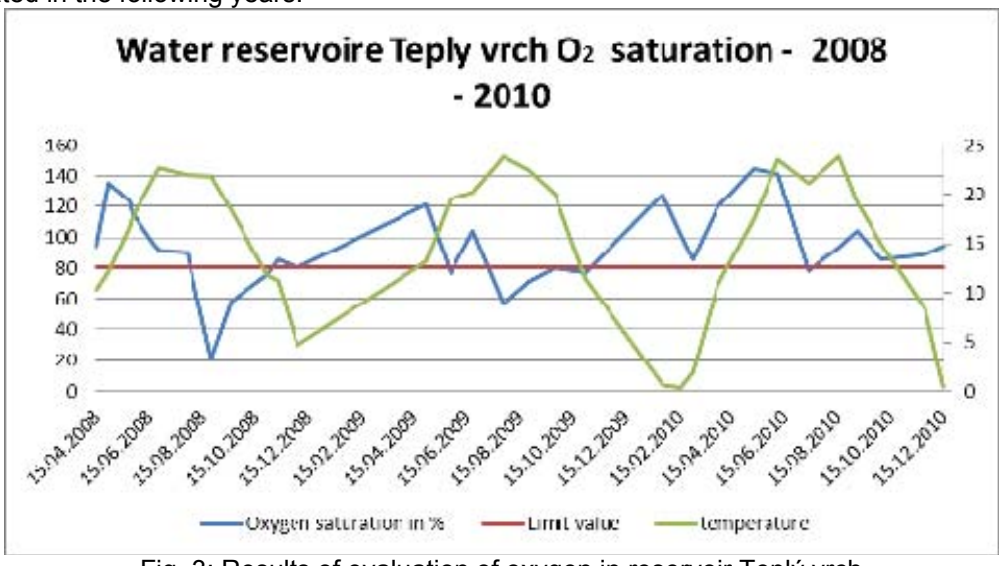

Fig. 3: Results of evaluation of oxygen in reservoir Teplý vrch

Similarly, short-term values are exceeded limit values for chemical properties of water. Constantly elevated pH may indicate the presence of permanent planktonic organisms whose activity causes the reduction of the proportion of ions H. Evaluation results for the last three years are shown in the following chart. PH is increased especially in the summer, and therefore during the bathing season.

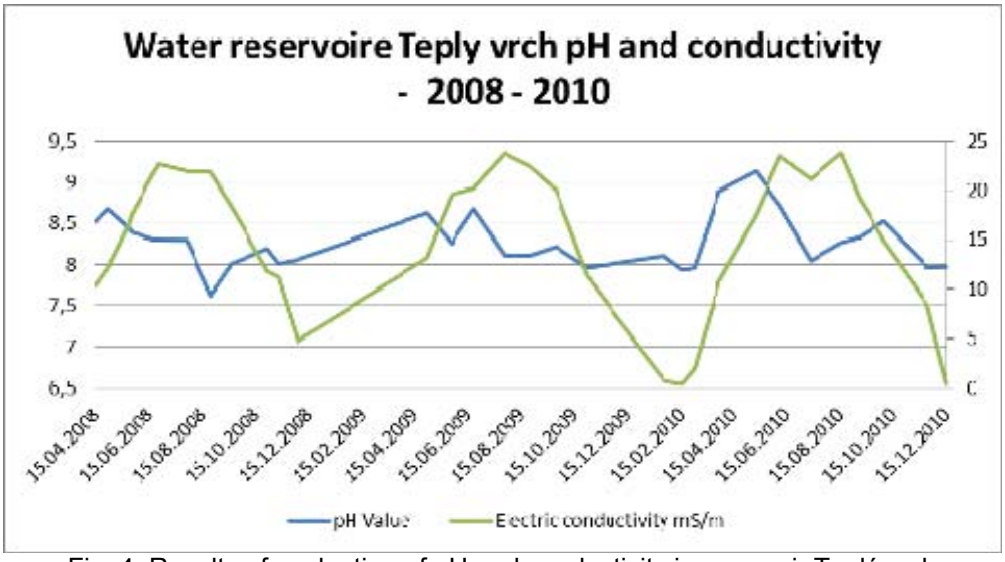

Fig. 4: Results of evaluation of pH and conductivity in reservoir Teplý vrch

Discussion

EU Member States will have to comply with the stricter and more ambitious requirements laid out in Directive 2006/7/EC by 2015 at the latest. The new legislation requires more effective monitoring and management of bathing waters, greater public participation and improved information dissemination.

By March 2011 Member States have to have established bathing water profiles.

The Eye On Earth - Water Watch application (http://watch.eyeonearth.org/)

Allows users to zoom in on a given section of the coast, riverbank or lake, both in street map or, where available, bird's eye viewing formats. A 'traffic-light' indicator (red, amber, green) of bathing water quality, based on the official bathing water data, is put alongside the ratings of people who have visited the bathing site, including any comments users wish to make. For historical data Water Watch uses a simplified index of bathing water quality data. The Czech Republic, Estonia, Finland (one municipality), Hungary, Lithuania, Luxembourg, Malta, the Netherlands, Norway (one municipality), Slovenia, and England and Wales and also Slovakia were also sending near real time information on bathing water quality to the Eye On Earth application.

Tab. 1: Bathing waters in selected EU counties (resource EEA, 2012)

Country	**Total Number of bathing waters**	**Compliance with guide values**
AT (Austria)	267	223
CZ (Czech Republic)	183	116
HU (Hungary)	228	127
IT (Italy)	647	499
LT (Lithuania)	98	70
PL (Poland)	131	76
SK (Slovakia)	**34**	**23**
EU	**6 493**	**4 572**

Compared with neighboring countries, with Slovakia, the possibility of people use natural bathing water is everywhere greater. After Slovakia joined the EU was designed for 67 bathing sites. Due to the poor condition of the water, almost half discarded. So today we have a shortage of water areas for recreation and the great interest of people bathing in our country. Therefore, people bathing in unapprovedrisk waters without monitoring and without actual knowledge of the risk. Because it's good enough sites frequented by people, it is necessary to consider their quality. After determining the parameters that are set at levels necessary to identify the sources of these types of pollution and take measures for their gradual elimination.

Conclusions

People's interest in the natural inland bathing waters will increase with global warming, Slovakia compared to neighboring countries, has wealth of water bodies, but at least approved for swimming because of water quality. All countries in the EU should be achieved by good surface water status and so there is a chance that it will improve the quality of water suitable for bathing. Recreation opportunity in their own country for water quality will cost more and further required by the population and the conservation authorities and the country will have to pay this demand in Slovakia. Legislation in the EU and in Slovakia revised requirements for bathing water quality. But it is largely dependent on the activities in the basin, such as point or non-point sources of pollution exposure and hence on the quality of our water where we want to recreate.

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http://watch.eyeonearth.org/ - Eye on earth (AitWatch, NoiseWatch, WaterWatch)

http://www.eea.europa.eu/data-and-maps/ - Explore an interactive maps.

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IT IS ALL ABOUT COMMUNICATION

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Abstract
Tourism and nature protection often coincide in the same area. Tourism in protected areas has various forms, an example can be the presence of huts or sports activities such as climbing. These activities were often present in the areas even before they started to be officially protected. When a protected area is pronounced, these activities are often restricted or prohibited and it is necessary to look for a compromise between these interests. This can be illustrated in protected areas around Brno. The way to the optimum solution should be mutual understanding and mainly communication between the leisure seekers and nature conservationists responsible for the area.

Key words: tourists, protected area, information, conservationist, nature protection authority

Introduction

The Czech landscape is an intensively used territory. A large part of it is interesting both for nature protection and leisure. Nature and landscape protection, according to Art. 1 of Act no. 114/1992 Coll., on nature and landscape protection, as amended (hereinafter the act on nature protection), is "*care provided by the state and physical and legal persons to wild animals, plants and their communities, minerals, rocks, paleontological finds and geological units, ecological systems and landscape units, as well as character of landscape and access to it*". The same paragraph says that nature and landscape protection also provide "*landscape protection for ecologically suitable forms of economic use, tourism and recreation*".
Recreation, or leisure, is the time or the activity people do to relax and regenerate their bodies, minds and souls. These terms are also related to the space where the relaxation takes place. Varied and preserved natural areas, which are also valuable from the perspective of nature protection, are highly popular.
Both nature protection and recreation in the countryside have a long tradition in the Czech Republic. The purpose of this paper is not to describe their history and the related issues. Its aim is to deal with the issue of communication, or rather non-communication between nature conservationists and leisure seekers or tourists.

What is communication

First of all, we should define the term "communication". The term has its origin in Latin word *communicare* – connect, consult with somebody. Nowadays, the term has more meanings depending on the field where it is used. In philosophy, it is a category of idealistic philosophy meaning the contact through which "I" is demonstrated in another self (Filosofický slovník, 1976, p. 225).Another field where we can meet the term communication is physiology and situation stimulus – response, or stimulus – no response (Hartl & Hartlová, 2000, p. 265). The meaning of the term in sociology is "any transfer of information" (Velký sociologický slovník, 1996, p. 507), or transfer of information from one individual or group to another, as a basis of all social interactions (Giddens, 1999, p. 372, 550). Communication can also be perceived as transferring meanings among people (Janoušek, 1997). The above mentioned definitions of the term communication confirm that communication is a basis of social interaction. "*Our everyday life is full of different forms of communication. We communicate with others or we accept messages of speech, letters and a number of non-verbal communication signals*(Hayesová, 1998, p. 29)."
The term motivation in one of its meanings can express driving power of an agent's behavior. To be able to communicate, we need motivation, a reason. The reasons may be highly varied. Plaňava (1996) describes a message of relationship, which either reflects, marks or creates a relationship, content and a power aspect – an action dimension.
There are big differences between specific events of communication. There are different aims, motivations, distances between people, positions of the communicators, emotional expressions. Moreover, each communication takes place at a time, in a space and under specific circumstances, i.e. in a specific context or situation context. This context can be external, i.e. spatial layout, temporal relations, participants, way and reason for communication; or internal, e.g. the state of the organism and mood. Watzlawick, Bavelasová & Jackson (1999)

describe the main communication axioms:we cannot avoid communicating,the content and relationship aspect of communication, phasing of the procedure of events, and symmetric and complementary interaction.
Besides the above mentioned selected communication axioms, it is necessary to be aware that communication takes place both verbally and non-verbally. The most important feature of verbal communication is mutual understanding, i.e. ability to see the same meaning in the same words. However, there are also paralinguistic factors (Janoušek, 1997), such as intonation, emotional colour of voice, accompanying mimics, etc.
To sum up – communication between tourists and nature conservationists means transfer of information, giving meanings, context, verbal and non-verbal expressions and mainly there are consequences of communication; the main thing that must be remembered here is the axiom "we cannot avoid communicating", i.e. communication is even if you do not meet somebody.

Nature protection versus recreation
Specially protected areas are very attractive and popular for many leisure activities. One of these activities is climbing, which is more and more popular nowadays. It is often done in protected landscape areas (PLA) in the surroundings of Brno – PLA Moravian Karst, PLA Pálava and PLA Žďárské vrchy Mts. The beginnings of climbing in the mentioned PLAs date back to the end of the 19th until mid-20th century. Nature protection came later to these territories and restricted leisure activities performed in them. With this, communication became highly necessary for the co-existence of differing interests that were focused on the same places.
People, either leisure seekers or local inhabitants, always spend a lot of time in these protected areas. They climb rocks, do hunting, pick forest fruits, gather firewood and do many other activities. These people thus affect the environment of the specially protected areas. Therefore, the nature conservation institution has to direct these activities to suitable parts or in the optimum direction. This can be secured in various ways – environmental education, information boards installed in the terrain, information materials (brochures, leaflets), discussions, or professionals and volunteers of nature conservation working directly in the terrain. All the above mentioned ways can be considered forms of communication. Although personal contact is often the most appropriate form of communication, unfortunately, meeting a conservationist in the terrain is very rare. This is very different from the situation about twenty years ago, when it was common. They took the same buses, went to the same pubs and moved in the same natural and social space. Moreover, their function was also performed by gamekeepers who took care of the forest district (or other enlightened personalities related to the territory). The current not really optimum situation is a consequence of the prevalence of office work within nature conservation (but not only there) when compared to the past. That is why nature conservationists are seen and talked about as kind of virtual persons that are far away. With respect to the current situation in the society, in which anything "protection-related" is perceived negatively, they are not seen otherwise.
The above mentioned well relates to climbing in PLA Moravian Karst, PLA Pálava and PLA Žďárské vrchy Mts., which are shortly characterized below.
PLA Moravian Karst was established in 1956. "*The mission of PLA Moravian Karst is the conservation of all unique items of living and non-living nature as well as cultural and technical monuments while gentle forms of economic use of the area are developed* (Správa CHKO MK, 2013)." The Moravian Karst, together with Pálava, is the oldest training area of climbers from Brno, which is determined by the easy accessibility and short distance. The beginnings of climbing are hard to find as local inhabitants have done it for ages. Also the first documented descent to Macocha abyss in 1723 can be considered climbing. The documentation of first climbs shows a high increase in the 1940s. At that time, climbing was not restricted temporally or geographically. Concurrently with the beginnings of climbing, huts for climbers started to appear. The community of climbers always mixed with the communities of spelunkers and tramps;sometimes it is hard to distinguish them. The establishing regulation states: "*Climbing is only allowed for organized climbers at places determined by agreement among all participating parties* (AOPK, 2013)."
PLA Pálava was established in 1976. "*The mission of the area is protection of all landscape values, its appearance and typical features, as well as natural resources, and creation of a balanced environment; typical features of the landscape are mainly its surface forms including water streams and bodies, the climate, the vegetation cover and wild animals, the layout and utilization of the forest and agricultural lands and in this relation also the layout and architecture*

of settlements, architectonic buildings and local architecture of folk character (Decree, 1976)."Climbing in Pálava is documented in 1899, when it was discovered by Ing. H.Bock(Doležal et al., 1988). Jurassic limestone of the Pavlovské vrchy resembles the Dolomites and is very popular until today.

PLA Žďárské vrchy was established in 1970. "*The mission of the protected landscape area is preservation of harmonically balanced cultural landscape with a significant proportion of natural ecosystems. Its landscape character, formed since the medieval colonization of a former border forest, consists of forested ridges of the Žďárské vrchy together with fields and meadows with woody vegetation, picturesque ponds and country settlements with features of local folk architecture* (Správa CHKO ŽV, 2013)." Typical features of the Žďárské vrchy are gneiss rock formations protruding in the forested ridges. These terrains were discovered for climbing by the teacher Aleš Zavadil from Nové Město na Moravě after 1940 (Doležal et al., 1988). Since then, the training rocks of the Žďárské vrchyhave been used for climbing.

However, the times have changed considerably since the beginnings of climbing. The increasing popularity of adrenalin sports, an increasing level of technical equipment, a decrease in risk factors, an increase in life standard and a lot of free time bring more and more people to the rocks. Climbing has thus become an important factor affecting the condition of specially protected areas and their care, in some areas this sport even dominates. The interest of a large part of the public – climbers – is legitimate, on the other hand, nature protection cannot give up its main mission in specially protected area, i.e. maintenance or improvement of the state of their natural environment. It is more and more difficult to find an acceptable compromise. Moreover, climbing today is not a homogenous activity; it has differentiated into many events with their own specifics, even relevant for nature protection (Hušek, 2008).

The points of conflict between this popular sporting and leisure activity and nature protection are obvious. Possible negative influences include damage to the surface of rocks and the vegetation cover (including e.g. removal of free stones and vegetation, "cleaning" of clefts, cutting off woody plants or placement of fixings), treading of the terrain in the vicinity of rocks and the access roads, erosion, illegal camping sites, fireplaces, litter and excrements, disturbance of animals in their natural environment (mainly nesting birds), troublesome use of magnesium, entrance and parking of motor vehicles near the rocks outside the permitted places, etc. Most of the above mentioned negative effects of climbing are not usually devastating, but only provided that the intensity of the activity is adequate and regulation tools available to land owners, local governments and state administration of nature protection, forests and gamekeeping are used consistently (Hušek, 2008).

Currently, climbing is only forbidden by the act on nature protection in national parks and national nature reserves. In these areas it is necessary to ask for an exception from the law. However, some activities are restricted to places reserved for them by the act on nature protection in specially protected areas of some categories or in some of their zones. This often concerns climbing, camping and making fire. The regulation then sometimes uses formulation "*except places reserved by the nature protection authority*" or "*reserved with consent of authority*". The legislator's intention within these two different formulations is not clear but the difference is clear and the nature protection authority has to respect the difference and perform them differently. Thus in some places, they are reserved by the authority, in other places the consent is granted within another proceedings (e.g. when approving the territorial plan) or on demand. The formulation about reserved places as if automatically assumes that there are some reserved places for the activity, although not in all specially protected areas. If there is a substantiated need and no conflict in the area, the relevant nature protection authority (most often of a protected landscape area or a national park) can be asked to define the reserved place or to grant consent with its reservation. If the agreement is granted, the administrator of the place is not the area administration but the applicant or other entity will be responsible for meeting the stipulated conditions. The term reservation does not necessarily mean an obligation to mark the place in the terrain. In some cases it is demanded (e.g. on a camping site a user should know where the site ends so that they do not put up a tent outside), in others it is not (e.g. in climbing, where the marks would inappropriately lead other tourists outside roads). Some of the reserved places can be marked in the map only and not in the terrain (Vítek, Hošek, 2011).

In specially protected areas, with exception of national parks and national nature reserve, climbing is not explicitly dealt with in the regulation, but restrictions may follow from protection conditions stipulated in individual legal regulations that establish the specially protected areas.

These conditions link climbing to the consent of nature protection authority that has pronounced the specially protected area, or to marking of climbing terrains with the consent of the relevant nature protection authority. The conditions usually state that climbing (and other activities) is possible “only with a previous consent from the nature protection authority”. This formulation is common and can be found in many rocky areas with the status of a specially protected area. If climbing is restricted in this way, it is necessary to submit an application for the consent. Based on the application, the relevant nature protection authority will make a decision, which consists of the consent and usually also conditions under which climbing or other activity can be performed. This is a standard procedure that has been used in many specially protected areas (Český horolezecký svaz, 2013a). The exception or consent is not commonly granted to individuals, as concerns climbing. A large part of the climbing public in the Czech Republic is represented by the Czech Climbers Union - Českýhorolezecký svaz (Tkáčiková, Vaculík, 2009). The Czech Climbers Union is a citizen association established in 1990 (in its current form), which follows the activity of a number of climbing organizations that were active in the territory of the Czech Republic before. Its activities include:

- negotiating the permissions and climbing conditions in specific specially protected areas,
- informing the climbing public on opportunities and conditions for climbing in rocky areas,
- implementing conditions stipulated by nature protection authorities (marking of access boards, installation of information boards, etc.),
- monitoring newly pronounced specially protected areas and changes in protection conditions of the existing specially protected areas,
- methodical and information activity concerning nature protection.

From this perspective, the most important activity is the negotiations with nature protection authorities on the options and conditions for climbing in specially protected areas, because most of them lie within rocky areas of the Czech Republic. The Union thus continually negotiates with the administrations of national parks, protected landscape areas and other nature protection authorities. The necessity to negotiate continually follows from the fact that nature protection authorities grant climbing permissions to limited periods and thus they have to be renewed. The Union also cooperates with the Nature Conservation Agency of the Czech Republic with the aim to help find and maintain balance between interests of climbers and interests of nature protection. (Český horolezecký svaz, 2013b)
The role of nature protection authorities in the regulation of climbing in specially protected areas is of key significance. However, it has been proved that even a good decision loses their sense if the authority is not able or willing to insist on the stipulated conditions consistently. In this respect, the role of the guard service and its personnel and material provision in PLA administration is essential and does not concern climbing only. Regulation can only be effective if the stipulated conditions are clear and professionally substantiated; then they are usually accepted by the other party. It is also necessary to find a model of correct cooperation to check that they are met. Communication with the climbing community is vital for nature and landscape protection institutions and it is recommendable to use various information techniques for relevant and current information on the development of activities. (Hušek, 2008)

Conclusion

It is undoubtedly a positive fact that the issue of nature protection and recreation have recently become a centre of attention of many scientists (e.g. conference Recreation and Nature Protection) as well as professional employees of nature protection institutions (Ochrana přírody, 2010). It is naturally possible to find points that could be improved within the communication between nature protection employees on one side and people using naturally valuable areas for recreation; we can find inspiration in the existing positive cases both in the Czech Republic and abroad as this kind of information has a better level in many other countries. In the case of climbing, there is the positive uniting role of the Czech Climbers Union and the ability of mutual understanding of all participating parties. Unfortunately, this kind of constructive communication is not possible in all recreation activities as in some of them there is not a similar uniting organization or even there is no entity able to communicate.
In conclusion, nature protection in recreation areas or recreation in protected areas would contribute from better communication between nature protection authorities and leisure seekers; and if possible, this communication should be equal and sensible.

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LM3 – LOCAL MULTIPLIER IN ENVIRONMENTAL ECONOMICS

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Abstract
This study aims to evaluate the application usage of local multiplier 3 (LM3) in the area of environmental economics on a theoretical basis. The analysis monitors the utilization of LM3 by government organizations (subsidiary organizations, state organizational units) established by the Ministry of the Environment of the Czech Republic and tasked with the administration of specifically protected land areas. The study aims to provide an assessment of the contributions made by organizations dedicated to this specific approach to the development of regional and interregional movement as well as analyze the expenditures of individual organizations. The text also deals with specific aspects associated with the management of organizations established for the purpose of nature conservation and landscape protection as well as with the potential application of the obtained results in the area of planning future national parks and protected areas in the Czech Republic and their impact on the local economy.

Key words: analysis, local multiplier, environmental economics, protected areas

Introduction

Environmental issues and environmental protection especially have been of growing interest to the public since the 1960s. The United Nations Conference on the Human Environment held in Stockholm in 1972 may be considered a turning point. The sudden energy crisis which took place in the first half of the 1970s marked the first serious warning with respect to the extensive development of the economy and the often overlooked relationship to the environment in which man lives. A comprehensive approach to environmental problems is associated with isolated monitoring or – on the contrary – a synthesis of individual elements. Initially, environmental issues were frequently examined in isolation. The employment of a complex approach which approached the environment as a comprehensive whole with both internal and external relationships was a significant step forward. It was gradually established that environmental protection is a matter which cannot be left to the individual responsibilities of the private sector; it became necessary to involve the state in both the monitoring and in the protection of the environment. The Ministry of the Environment was founded, as were other state agencies tasked with the supervision of this sector. These bodies in turn began the process of establishing individual organizations whose mission was to manage nature conservation and landscape protection in a specific region. Relevant legislation was systematically developed and the economic impact of nature conservation and landscape protection on the state and on individual regions, i.e. one of the areas of interest to environmental economics, was monitored. Environmental economics focuses on the economic aspects of environmental protection and development.

The objectives of environmental economics include e.g.:

- raising the quality of life of a population while preserving a high level of environmental quality,
- achieving environmental objectives at the lowest possible social costs,
- improving the rationality, efficiency and effectiveness of public environmental policy,
- integrating environmental and economic policies,
- optimizing economic development with respect to environmental policy objectives.

Environmental economics as a separate economic discipline first emerged in the 1960s. It was primarily inspired by traditional neoclassical welfare theory and – to a certain extent – also by the Coase theorem. Its establishment coincided with the so-called 60s and 70s environmental revolution, which led to greater importance being attached to environmental problems on the international political scene (Oates, 1992).

One of the definitions of environmental economics was provided by Charles D. Kolstad:

"Environmental economics deals with the impact of the economy on the environment, the importance of the environment for the economy and the issue of adequate regulation of economic activity in order to achieve a balance between environmental, economic, and other societal goals" (Kolstad, 2000).

The prevailing global trend currently favours the unrestricted movement of goods, services and capital. This approach has extensive negative environmental impact (e.g. high consumption of

fossil fuels) as well as adverse socio-economic influence (e.g. decline of local production, unemployment, economic inequality between regions and individuals). However, emerging movements stress so-called economic localization, which focuses on the support of locally owned businesses using local resources in a sustainable way, employing local workers at fair wages and serving primarily local markets. This issue is closely liked to environmental topics and to the topic of sustainability: a network of small self-contained economies may be expected to constitute a more efficient utilization of local resources and – thanks to its decentralisation – also a lower degree of dependency on transportation. The localization movement seeks to alter the emphasis government is placing on foreign investment support, specialization and export in favour of the support of diversified local production of small and medium enterprises which may be expected to remain in a given area, and which have closer economic ties to other entities in the region, thereby leading to a more stable retention of capital in that locality. In order to help describe the circulation of money spent at locally-owned businesses within a municipality, the UK-based New Economics Foundation developed the so-called local multiplier. The local multiplier may be used as a practical indicator of sustainable development and a simple tool for suggesting actions to reinforce sustainability. The local multiplier is a very good sustainability indicator. It describes the degree of localization of a local economy (municipality, region), i.e. how much money circulates inside this economy and how much is escaping outside it. Calculating the local multiplier is thus the first step towards recognizing the importance of local economies with respect to achieving sustainable development. The local multiplier may also be used to help define measures leading to the strengthening of a local economy.

Material and methods

Theoretical background

The idea of a multiplier as a macroeconomic indicator was developed in the 1930s and 1940s by the famous English economist John Maynard Keynes. His economic theory was conceived as a response to the Great Depression. He claimed that waiting until the economy recovers from the crisis by relying on a spontaneously functioning market mechanism is irresponsible. He proposed an economic policy which accepted national and governmental interference. This policy also included the utilization of the multiplier effect. The multiplier effect occurs when a change in spending induces a proportional change in overall demand, thus helping to revive the economy (Kutáček, 2007).

The value of a local multiplier may be specified for any institution (company, retail shop, local authority, non-profit organization, social organization or household) which has certain expenses and wishes to ascertain how much of the money it spends remains in a given region. In other words: the local multiplier indicates how much of the money spent by an enterprise or other economic unit circulates within the region before it is redirected elsewhere and how much of it is used as a source of income for other local organisations (particularly for suppliers of the goods and services) and individuals (particularly employees). The value may be calculated in several phases, including expenditures of the assessed institution as well as the expenditures of the above mentioned suppliers and employees – i.e. all parties accepting money from the institution (Kutáček, 2007).

It may be said that the economics of protected areas ranks among the key problems of economics of natural resources, environmental economics and ecological economics. The fields of environmental economics, economics of natural resources and environmental economics are tasked with answering the question of how the environment, its individual components and features are to become a part of economic benefits and costs (POLSTER, 2002, modified).

State-established contributory organizations charged with the protection of nature are legal persons with a designated place of business in the Czech Republic and tasked with managing the property of the Czech Republic. These organizations are founded by government authorities. Should the establishment and activities of the organization result in new state budget requirements, the establishment requires the consent of the Ministry of Finance. The establishment of subsidiary organizations must be announced in the *Official Journal of the Czech Republic* (Stuchlíková, Hympánová, 1998, modified).

Their management is defined by Act No. 218/2000 Coll. on Budgetary Rules and by Act No. 219/2000 Coll., on the Property of the Czech Republic. Their accounting is governed by Decree No. 410/2009 Coll., implementing Act No. 563/1991 Coll., on Accounting (SVOBODOVÁ, 2008).

A state-administered organization manage resources allocated by the state budget as indicated by a chapter administrator in accordance with the chapter budget and unless otherwise

stipulated in a separate legal regulation while adhering to a legal minimum as set out in the binding characteristics of the relevant state budget act. Its income constitutes budgetary income and its expenditures constitute budgetary expenditures, unless otherwise provided by the act. The budget of a state-administered organization may include only the income and expenses associated with activities set out in its founding charter or activities set out in its establishing act (i.e. Act No. 218/2000 Coll.).
Methodology
The LM3 – local multiplier is calculated in three phases.
Phase 1 – calculation of the annual net income of the organization in question;
Phase 2 – stratification of the organization's expenditures, differentiating between expenditures spent locally and expenditures spent outside the region, while focusing on expenditures spent in the region: expenditures associated with employees, suppliers of goods and services, reinvestment of profits in the company's development and rent or mortgage expenses.
Phase 3 – The third phase requires the determination of how much is spent by local employees and suppliers in a given region; the most common consumer expenses include food, clothing, leisure time and entertainment and rent or mortgage while the expenses of suppliers (organizations) tend to approximate the spending of the organization in question (personnel costs, suppliers of goods and services, rent or mortgage).

Results
Sample calculation:
Sum total = phase 1 + phase 2 + phase 3 LM3 = Sum total (phase 1, 2, 3)/ phase 1
Example:
Phase 1: 100,000 CZK
Phase 2: 40,000 CZK
Phase 3: 20,000 CZK
Total: 160,000 CZK LM3 = 160,000 / 100,000 = 1,60
This means that every 10 CZK received by the organization as income creates a sum of 16 CZK for the regional economy. One crown (1 CZK) of the organization's expenditures creates 1.60 CZK for the local economy. In other words, one crown (1 CZK) of expenditure creates an additional 0.60 crowns in income for the regional economy (1,60 – 1 = 0,60).
Documentation:
According to Decree 410/2009 Coll., which implements certain provisions of Act 563/1991 Coll., on Accounting, as amended, the financial statements of government organizations must include the following:
a) balance sheet
b) profit and loss statement
c) appendix
d) cash flow statement
e) internal capital shift statement
An important element of the calculation of the second LM3 phase is the division of an organization's expenses into those spent in the local region (employee wages, local suppliers). A substantial period of time is thus necessary in order to obtain the necessary information. Data may be acquired from economic department employees or from the managerial accounting of the organization in question.
The third LM3 calculation phase is designed to determine how local people and organisations associated with the selected organization spend their money.
A survey must thus be conducted in order to complete the third calculation phase.

Discussion
The LM3 calculation indicates a local multiplier score. It is essential to consider what steps to take and what the LM3 score actually means. Does the subject (established by the Ministry of the Environment) sufficiently contribute to the local economy or it is necessary to take certain measures in order to ensure that the organization contribute more?
The LM3 score also quantifies the following:

- whether the organization employs persons from the region or from outside of it,
- whether the region provides a sufficiently extensive and qualified workforce,
- whether top management may be from another area and therefore tends to hire employees from that area,
- the results clarify which suppliers are local and which are located outside of the region.

All of these findings raise questions regarding the management of the organization and the potential of the region.
When monitoring the contribution of a given subject to the local economy, the following aspects must be mentioned:

- the organizations in question were established with the objective of nature conservation and landscape protection in accordance with Act No. 114/1992 Coll., on Nature Conservation and Landscape Protection, as amended;
- significant financial aid provided by the founding authority (Ministry of Environment) in the form of contributions for activities (tens to hundreds of millions of CZK per year according to the size of the administrative organisation or other protected area);
- unlike businesses or companies, these organizations are not designed to generate profit;
- without the financial support of the founding authority, these organization would not be able to function and perform all of the stipulated legal conditions necessary for nature conservation and landscape protection;
- internal management is governed by Act No. 218/2000 Coll. on Budgetary Rules, as amended, with principal and secondary economic activities;
- internal revenue may be generated from the sale of lumber, game meat and other commodities.

Environmental economics is attempting to make use of the elements of economic analysis since separating economic and environmental perspectives is problematic in practice. It must be emphasised that the protection of the environment often necessitates significant financial resources. However, it may be argued that – unlike businesses – the organizations in question are not designed to generate profit. A non-profit organization may profit, but – unlike in the case of businesses – the profit may not be distributed among the founders, partners or employees of that organization or other persons associated with the organization. Profit must be used to finance the activities for which the organization was established. These organizations are responsible for providing or may directly provide certain goods and services to society as a whole or to households or individuals on a non-market basis.
Should a discussion regarding the economic level of a region arise, the economic factors indicating the level of economic prosperity should be listed. The primary factors include GDP (absolute, per capita, per employee), per capita income, taxation and industrial composition.
A local economy which has retained at least part of its local economic ties (local business ownership, local production utilizing local resources, local sales recirculating local money) is not only less vulnerable from a global economic perspective but also efficient in the sense of wasting less energy and natural resources, particularly in terms of food products transport, packaging and processing (preservation). As reported by Kutáček (2007), the local multiplier is therefore a highly application-appropriate indicator of sustainable development relevant to local economic development which reduces its unwanted environmental and social impacts rather than exporting them to economically weaker countries. LM3 may also be used in a regional and local context in order to quantify the effectiveness of expenditures invested in economic sustainability and regional viability. It may be utilized by small, medium or large companies striving to establish themselves in the environmental and social areas: companies may practically demonstrate how they aim to support the local economy by choosing local suppliers and hiring employees from the region.

Conclusion

Organizations tasked with the management of national parks and protected landscape areas are directly involved in the promotion of a wide range of social functions associated with forests and the landscape as such as well as offering leisure time activities and edification. These organizations are not designed to generate profit: they are primarily tasked with nature conservation and landscape protection, thereby contributing to the improvement of the quality of life as required by society.
However, it is necessary to emphasize the amount of funding drawn from the state budget in order to provide for the operation, management and maintenance of protected areas. The LM3 local multiplier thus serves as a methodological application tool uniquely capable of quantifying the intensity and efficiency with which organizations established for the purpose of nature conservation and landscape protection contribute to the economy of the region they are operating in and therefore the extent to which they are involved in its development.

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MAPPING ILLEGAL DUMP SITES IN THE COUNTRYSIDE

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Abstract
This paper describe ecological project www.ZmapujTo.cz; its aim is the fight against illegal dump sites in the Czech Republic. The project serves for everybody who do not like illegal dump sites in our towns, villages and the countryside and who want to do something about it. Today, users of smart phones can report a dump site easily and quickly thanks to mobile phone applications; other users can report using an interactive web form. The aim of the project is to take part in the solution of the illegal dumping problem in the Czech Republic by providing an up-to-date, efficient and widely available platform for monitoring of such sites as well as services related to the administration of the reported sites for municipalities and organizations.

Key words: illegal dump sites, mapping, mobile phone applications

Introduction

Illegal dump sites have always been a trouble endangering not only our environment but also our health. Therefore, we should not be indifferent to them and if we find an illegal dump site, for example when walking in the fields or in the forest, we should immediately inform competent authorities to take measures. Thanks to the linkage of the project with local governments as well as forest owners, PLA administrators, etc., the person who owns the specific site can quickly find out about the dump site and take action.
The ZmapujTo.cz project aims to inform the public about the dangers related to illegal dump sites, motivate the public to report them, and offer municipalities and other organizations a tool for administration of these reports.

Illegal dump sites

An illegal dump site is a place where somebody disposed of waste illegally. Dumping is not permitted there by appropriate authorities, it is not technically prepared for dumping and the person responsible for dumping is unknown and it would be highly difficult, or impossible, to find him or her.
An unsecured illegal dump site poses a threat of leakage of harmful or poisonous substances to the air, soil and water – the local ecosystem can be thus heavily damaged and e.g. a source of drinking water for local inhabitants can be endangered. There are usually rodents in these sites, which can transmit various infectious diseases. Based on the type of dumped material, there is the danger of fire of the surrounding flammable items (buildings, forest, etc.).
The issue of illegal dump sites has been discussed in the Czech waste management for many years. The essential reason for these long discussions is the inability to identify the entities that established the dump site, i.e. the entities that could be held responsible for the dump site and who could be commanded to remove the illegal dump site, or who could be fined for its establishment.
The current relevant act, i.e. act no. 185/2001 Coll., on wastes and on changes of some other acts, as amended, does not solve this issue complexly and the issue of removal of illegal dump sites is much less effective than it was based on the previous act, i.e. act no. 125/1997 Coll., on wastes. The previous act, in contrast to the current one, explicitly stipulated that the responsibility for wastes illegally dumped at a site was in the hands of the site owner.
A detailed legal analysis of the issue of illegal dump sites can be found in the thesis of Mgr. Radka Pilátová (Pilátová, 2010).

History of the project

The project of mapping illegal dump sites was started in mid-2011, the web site ZmapujTo.cz was put in operation in summer 2012 (Fig.1.). The initial aim of the project was to motivate users to start creating the map of illegal dump sites. That is why we concentrated on promotion of the project among potential users.
At the end of 2012 we put the administration in operation for municipalities and we tested its functionality in pilot territories. Currently (March 2013), the administration function is fully operational and we are trying to involve as many municipalities, town districts and other organizations responsible for elimination of illegal dump sites as possible.

Fig. 1: ZmapujTo.cz web site

Contributions of ZmapujTo.cz

The main contribution is the possible information of the broad public on the issue and economic drawbacks of illegal dump sites. The project also contributes to a more efficient use of resources used for the elimination of dump sites; it can also contribute to catching the founder of illegal sites; finally, it contributes to their prevention.

An active involvement of municipalities in the project has many advantages. The municipality makes the citizens aware that it takes the issue of illegal dump sites seriously and it also saves its expenses of finding new dump sites in its territory. Moreover, a timely finding of a new illegal dump site reduces the expenses of its elimination. The application allows for an easy surveying of the sites even in difficult terrains, including the plot number and the owner. An appropriate authority can thus gain maximum information about the illegal dump site without seeing the site personally.

Timely removal of illegal dump sites can also prevent damage of a larger extent (water contamination, hazard of fire, etc.), it improves the safety, provides prevention of possible injuries (children, animals), and prevents further uncontrollable extension of illegal dump sites.

How to report illegal dump sites

The primary way of sending reports of illegal dump sites is mobile phone application ZmapujTo. Currently, the application is available for mobile operational systems Android and iPhone.

The user takes a photo of the illegal dump site, marks its exact location in the map (the GPS in the mobile phone determines the position approximately, the user can then change it so that it fits the reality). Then the user selects the site size, what type of waste is there and sends the report (Fig.2.).

The reports are anonymous, but the user can also insert an optional commentary or contact data. After checking if the report is genuine (elimination of spam or experimental/erroneous reports), all reports are displayed in the interactive map and the related municipalities can use the information to solve the problem.

Alternatively, the user can use the web interactive form to report an illegal dump site from the comfort of their homes. The interactive form can be opened in a computer with a common web browser, or in a mobile device (smartphone, tablet). The address for the web browser is http://new.zmapujto.cz.

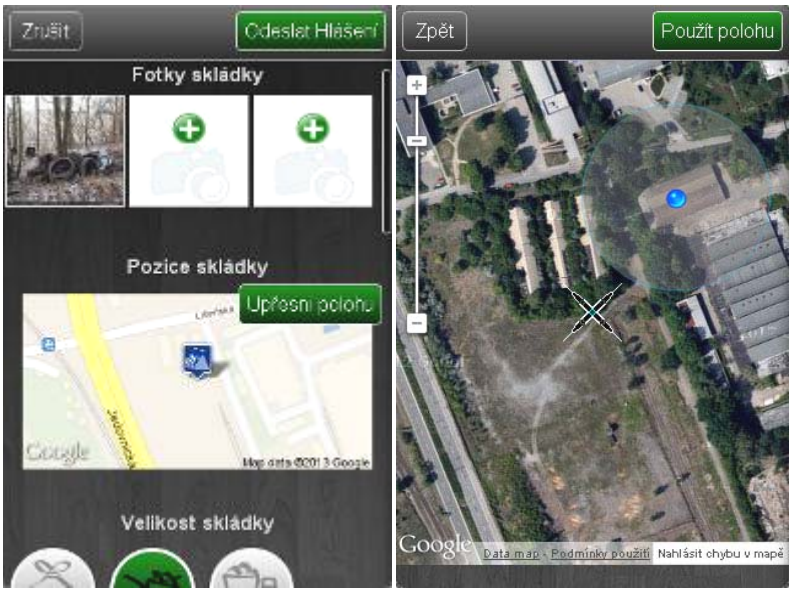

Fig. 2: Print screens of the mobile phone application for reports of illegal dump sites

Map of reported illegal dump sites

After the mentioned check of reports, the reported illegal dump sites appear in the interactive map of illegal dump sites, available at http://skladky.zmapujto.cz (Fig.3.). This map has filters of new reports, reports about to be removed, or the already removed dump sites. The bottom part of the interactive map shows a list of the latest reported illegal dump sites. The map can also show a list of the dump sites nearest to a specific location, including information about the distance from the place.

Fig. 3: A print screen of the interactive map with illegal dump sites

The interactive map has several layers (including satellite images), as well as the map layer of the cadastre of real estates, which allows for an easy identification of the owner of related lands. In the future, more layers can be integrated (e.g. points of waste collection, legal dump sites, contaminated places, etc.). The map is also equipped with the Street View technology which allows seeing the place using panoramic photos taken in the street. Thanks to this, a user can gain a very detailed idea where the illegal dump site is without even going there.

Administration of reports on illegal dump sites

An important part of the project is administration of illegal dump sites, which allows municipalities or other interested organizations to get involved in the project. The aim of this part is to provide a tool using which municipalities will have current information about dump sites reported in its district (Fig.4.). The administrator of the municipality allotted to a specific dump

site can change its status – e.g. when they are preparing to remove it, it has been removed, comments can be added, or reports concerning the expenses of its removal. If a new illegal dump site appears within the district, the administration system sends an email. The administrator can also use the statistics of the district and a widget, which can be placed on the municipality web site and inform thus the visitors that the municipality is involved in the project, how many dump sites have been reported, removed or what expenses were related to their elimination.
Currently, there are ten municipalities and institutions from the entire Czech Republic involved in ZmapujTo.cz. We are collecting their experience with using the system, their comments concerning improvements and we are expanding the service based on these. There is also a DEMO version of the administration thanks to which a potentially interested person can try the system.
One of the most active system users are employees of the city district Praha 10, who use the system intensively. They were even able to involve city police, who now report illegal dump sites and overfilled garbage bins as a part of their daily guarding walks. Within one month, there have been 76 illegal dump sites reported and 5 of them eliminated.

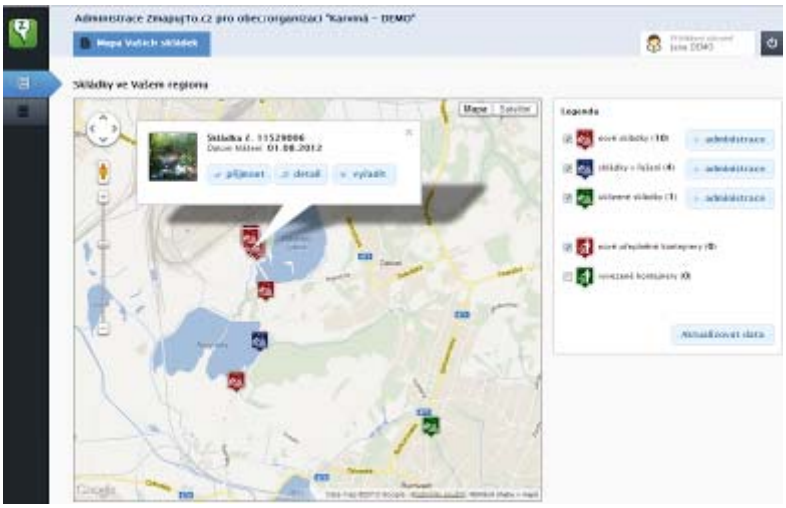

Fig. 4: Print screen of administration of illegal dump sites

Conclusion

The ZmapujTo.cz project was launched half a year ago and during its existence over 700 illegal dump sites have been mapped in the Czech Republic. Ten pilot municipalities are involved and over 40 illegal dump sites have been removed.
We believe that the ZmapujTo.cz project is sensible and has a great potential. We are looking forward to others interested in getting involved, either local governments and organizations responsible for elimination of illegal dump sites.

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METHODOLOGICAL APPROACHES TO THE ENVIRONMENTAL EVALUATION OF PLANS AND PROGRAMS OF THE RECREATIONAL DEVELOPMENT

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Abstract
The evaluation of Plans and Programs for the Recreational Development (or a part of it) could be elaborated according to the environmental impact assessment / strategic impact assessment methodology of the proposed objectives and priorities. This approach goes thrue 4 stages: the description of baseline environment including protected areas and social, cultural phenomenas as well; the establishment of aims and priorities; environmental evaluation; the integration of results into the plan/program. Every stage is characterised by input of available informations and tools, activities that take and output of results.
The proposed methodological approach amended by new dimension will be presented on the Myjava region which is characterised as a region reach of typical representant of landscape type: the „kopanittsee" settlements. The spatial expression of this type of cultural landscape could be seen in landscape structure with typical element – the mosaic of houses, gardens and orchards. This element imagines the interaction of traditional components which connect natural conditions together with a type of land utilization. At present from the recreational point of view „kopanittsee" settlements are known as areas of „second living".

Key words: nature, evaluation, protection, Vrbovce, public

Introduction

Tourism is the sector of cross-sectional character and its realization is directly interconnected with many other sectors (transport, culture, building industry, health care, various industry sectors, agriculture, etc.). It considerably affects the development of employment, whereas a high number of employees represent relatively insufficiently qualified manpower, just that, which constitues a major part of unemployed.
It contributes also to the salvage of historical architectonic monuments, to the protection of cultural values made by human generations and to the preservation of natural jewels (Demo et al., 1999).
In relation to the draft of Tourism Development Strategy of the Slovak Republic until 2020 (Ministry of Transport, Construction and Regional Development of the Slovak Republic, 2013) those forms are proposed: Summer tourism, Winter tourism, Spa and Health tourism, Cultural and Urban tourism, Congress tourism and Rural tourism and Agri-tourism. It could be seen that they are only minor changes according to the previous New Tourism Development Strategy of the Slovak Republic until 2013 (Ministry of Economy of the Slovak Republic, 2007) which proposed also wintersports a waterside holidays, but did not involved congress tourism as a new form.

Those documents according to the definition of Veel (2011) could be considered as plans: detailed strategies, typically set out in a document, designed to implement policies in particular ways over a specified period of time

According to the environment it exists a real assumption that those types of documents influence also the rural development. Rural environment is a major asset and provides economic, recreational, social and cultural benefits and opportunities. The long term well being of rural communities is particularly depended on the sustainable use of local resources. Taking advantage of environmental assets such as clean air and water, unspoilt landscape, natural resources, natural habitats etc. while at the same time protecting them, requires a co-ordinated approach and the integration of environmental concerns into all rural development policies and plans. They involve also a measures for rural tourism.
The term of rural tourism is understood as an original form of recreation in rural environment with the utilization of different features which are offered by this environment. One part of the rural tourism is known as an agri-tourism (the rural tourism

is realised on agriculture farm or in recreational possibilities of the agriculture organisations.). The benefits of the rural tourism could be seen as follow:

- offering of new, attractive and authentic recreation possibilities
- rational utilization of unused or inefficiently used infrastructure of rural settlements and landscape
- economic revitalization of countryside
- mitigation of migration impacts on rural settlements and mitigation of landscape ageing contribution in the sphere of nature conservation as a result of prevention of tourism boom and construction of resorts in the environmentally valuable and vulnerable areas.

To establish the tourism potential of rural territory there exist many methods considered to research aims.

Most of the disciplines contributing to tourism research now make use of a widy variety of research methods. Among social science concepts and issues they are: ontology, epistemology and methodology; positivist, post-positivist, interpretive and critical approaches; descriptive, explanatory and evaluative research; qualitative and quantitative research; empirical and non-empirical research; induction and deduction; theoretical and applied reasearch; experimental and non-experimental research; primary and secondary data; self-reported and observed data; and validity and reliability. (Veel, 2001)

Among nature sciences issues are mostly oriented on the evaluation of landscape potential (e.g. Butler, Hall, Jenkins, 1997, Mariot, 1983, Krnacova et al., 2005, Andel, Balej, Suchevic, 2008, Krnacova, Hrnciarova, Pavlickova, 2010).

Schneider, Fialova and Vyskot (2009) report Environmental Impact Assessment, Strategic Impact Assessment, biological evaluation, impact assessment on the landscape character, impact evaluation on NATURA 2000 elements as methodologies for the landscape utilization evaluation.

This idea could be considered as a basis for the analysis of recreational development written in regional / local plans in the relationship with rural development of chosen territory. For the purpose of this paper was the Myjava region, concrete the Program of economical and social development of Vrbovce municipality used.

Material and methods

Methodological approach of environmental assessment of development plans used within this paper is based on the VEEN Ecology consultation firm practice (1999). This methodology was verified also in Slovakia on several projects, among them the Development Plan of Agriculture and Country Side of the Slovak Republic for 2000 – 2006 years. This methodological approach is still appropriate for different types of plans and programs for the reason of the integration of geographical, environmental and sociological methods. Besides the analysis of environmental state the part of the methodology is focused also on production and nonproduction activities in the realtionship with nature protection, refer to basic problems, limits and risks of further development.

This approach goes thrue 4 stages: the description of baseline environment including protected areas and social, cultural phenomenas as well; the establishment of aims and priorities; environmental evaluation; the integration of results into the plan/program. Every stage is characterised by input of available informations and tools, activities that take and output of results.

Stop at the step 3 „Environmental evaluation“ which could be considered as an equal step to Strategic Environmental Assesment (the role of it is to ensure that environmental, social, health and economic aspects and also effects on sustainable development) the purposes are:

- to identificate alternatives, goals and priorites of the development plan
- to evaluate the compatibility and assumed effects of mitigation measures contra environmental / sustainable goals and indicators
- to present results of the evaluation of the development plan.

The output is the matrix of environmental development plan evaluation together with the written commentary to basis questions and evaluation of alternatives (see table 1).

Tab. 1: Environmental evaluation tourist acitivities

Activity	1	2	3	4	5	6	7	8	9	10
transport and travel	+	+/-	-	?	+/-	+/-	?	-	-	?
recreational nature based pursuits										
souvenir purchases										
infrastructure changes										
feeding wildlife										
use of firewoods										
new recreational facilities										
etc.										

Notes:
? = without impact; + = positive impact; - = negative impact
1 = geology; 2 = air; 3 = water; 4 = soil; 5 = biota; 6 = public; 7 = landscape; 8 = stability; 9 = nature protection; 10 = environmental quality

Analysed territory
The analysed territory of the microregion covers two important geomorphological units:
Zalostinska vrchovina with so called White Carpathian flish reaches 300-620 m of altitude in the peak parts. The relief is distinguished for medium or sometimes steep slopes that appear in the central and lower parts of valleys. Relative altitudinal division in peripheral parts of the mountain range is 181-310 m, in the central parts of the mountain range 311-470 m. Oak-hornbeam communities with sedge-grass (*Carici pilosae - Carpinetum, Queco - Carpinetum caricetosum pilosae*) can be found here. From the point of view of level of feasibility for rural tourism and agri-tourism of agriculture enterpriseing, the mentioned forest formation is assessed as forest communities extremely feasible for the given plans.
Myjavska pahorkatina is characterised by more smoothly modelled relief, sometimes with broad flat ridges. Slope inclination is 6-10°, rarely up to 15°. Myjavska pahorkatina is localised roughly over 220-250 m, only relatively small parts exceed 400 m. The largest part of the territory is covered by beech forest, in ridge locations also by talus forests with sycamore maple and ashtree. Myjavska pahorkatina has dryer climate and therefore there is a great number of xerothermic species with weak representation of Dealpine and Carpathian components. Modification of the original natural ecosystems in the whole area to agricultural landscape has, however, liquidated the previous abundance of the Panonic flora.
The most common soil types are cambisols, rendzina leptosols, fluvisols; texture of soils is within the range from loamy to silky – loamy (Micuda, 2006).
The development of land use is very close connected to settling the territory. Analyzed model territory belongs to ancied settlement areas with archaeological sites. Larger colonization is connected with construction of 2 castles (Cachtice, Branc) in 13th century and the period of Turkish wars. The rush of inhabitants income into model territory in 16th century. This rush was so great that the central parts of municipalities did not know to overlap the interest of colonized land. This situation motivated the formation of copanitseh when new buildings and new farms were established. Economically self - sufficient kopanittsee permanently apart from original central parts of municipalities were based. (Labuda, Pavlickova, 2006)
The Myjavska pahorkatina Hill Land was marked with very varied landscape mosaic and extensive land use. This territory was also typical with the smallest average area of agriculture land in the former Czechoslovakia. This value was 250 square meters. The process of collectivization, which could be pointed as a very important intervention into the land use in the Myjavska pahorkatina Hill Land, was very rapid till 1957 year (according to Stankoviansky, 2003). The dispersed settlements still exist and it is used as an „oasis“ for „second living“.
The territory is also known for natural beauties which are connected with the Protected Area White Carpathians and natural monuments (table 2):

- Natural Monument Buckova jama
- Natural Monument Kozikov vrch

- Natural Monument Malejov
- Natural Monument Stefanova
- Natural Monument Zalostinna.

Tab. 2: Natural Monuments of Analyzed Territory

Type	Name	Landscape Protected Area	Expanse	Year of declaration	Level of protection
Natural Monument	Bučkova jama	White Carpathians	40,91	1993	4
Natural Monument	Kožíkov vrch	White Carpathians	2,8285	1990	4
Natural Monument	Malejov	White Carpathians	0,8241	1990	4
Natural Monument	Štefanová	White Carpathians	5,4759	1990	4
Natural Monument	Žalostiná	White Carpathians	2,1199	1994	4

Results and discussion

In a relation with the development of favorable effects of the tourism on regional and micro-regional level it is important to coordinate it in a harmony with other economic activities and landscape potential. The coordination of these economic activities in the landscape, except others, predates the origin of environmental problems, which should be evolved as the consequence of the discord with natural and cultural–historical landscape potentials.

The analysed Myjava region covers many mucipalities - Brestovec, Bukovec, Hrasne, Chvojnica, Jablonka, Kostolne, Kosariska, Podkylava, Polianka Poriadie, Priepasne, Rudnik, Stara Myjava and Vrbovce – connected in the microregion. The main aim of the creation of this microregion was not only to protect but also top develop the „life“ at „kopanittsee“ settlements.

This microregion is also influenced by regional policies as the „Strategy of development of Trencin self-governmental region“ is (2003). This strategy is developed according to particular fields, the priority of them according to the „kopanittsee“ region is expressed in development plans of Myjava region. The tourism development is not specifik in the mentioned strategy for different regions.

Strategy of tourism development of Myjava region is based on individual programs of economical and social development – practical and realizable documents – of individual municipalities. They involve also the SWOT analyses of tourism development. The environmental evaluation as the step 3 of mentioned methodological approach for opportunities (table 2) was used for creating the conclusion within this paper.

Both mentioned plans can vary enormously in detail, complexity and formality. Of the many models of policy-making, planning and management processes that exist, the rational-comprehensive model is the most traditional „ideal“ model. Suffice it to say here, that these alternatives are often „cut-down“ versions of the rational-comprehensive model, emphasising some aspects of this model is virtually impossible to be completely comprehensive in assessing alternative policies; some reflex the act that political interests often intervene efore „rational“ or „objective“ decisions can be made; while others elevace community/stakeholder consultation to a central ether that supportive role. In nearly all cases the models, so the latter, even if rejected, remains the universal reference point. (Veel, 2011). This model contains 10 steps:

1. Terms of reference/brief
2. Statue valuse/milion/goals
3. Decide planning approach
4. Environmental appraisal
5. Consult with stakeholders
6. Develop options
7. Evaluate options
8. Decide strategy/goals/objectives
9. Implement – manage
10. Monitor/evaluace.

The step 4 could be considered as the same one as the step 3 of used methodology. But this approach is reached with other steps, mainly because of public participation. And this is one of essential principles of present Strategic Environmental Assessment practice according to the strict maintaince of Aarhus Convention (EEC UN Convention on Access to Information, Public Participation in Decision Making Process and Access to Justice and in the Environmental Matters was ratified in Slovakia on 5th December 2005).
For this reason it could be good to evaluate so called Stakeholder Participation Plan. The Participation Engagement Plan (SEP) includes the activities and interactions planned during the implementation of the plan preparationt, like the stakeholder identification and analysis, the information disclosure, the stakeholder consultation, the negotiation and partnerships, the stakeholder involvement in plan monitoring, the reporting to stakeholders and the management functions.
It should be developed on principles as:

- transparency
- providing meaningful information in format and language (mainly Slovak) readily understandable, and tailored to the needs of the target stakeholder group
- providing information in advance of consultation activities
- disclosure of information (written, oral) in ways and locations that make it easy for relevant stakeholders to access it along the consultation process
- use oral or visual methods to explain information to non-literate stakeholders
- respect for traditions of discussion
- clear mechanisms for responding to stakeholders concerns, suggestions and grievances; and adequate to the type of group consulted
- incorporating feedback, and reporting back to stakeholders.

Who are stakeholders it can be set into the following groups:

- the state and self-governmental authorities governing all aspects of any of the foreseen activities as well as environmental issues activities.
- permitting authorities on the state or self-governmental levels
- public - different categories of population inhabiting or working in both, very close and wider neighbourhood area
- local, national and international environmental and social NGOs
- business and professional associations
- expert and academic institutions
- „public concerned“
- workforce.

Conclusion

To ensure the positive effects of tourism within regional development it is supposes to coordinate the development in accordance with landscape potential and development of other economic activities. The coordination of economic activities development in landscape assumes the prevention of environmental problems which might occure as a consequence of discrepancy with natural and cultural-historical landscape potential (Krnacova a kol., 2005).
Dispersed settlements of Myjava regions have minimal job opportunities, the public is migrating into towns or central parts of municipalities and it causes rapid of the decrease of population number and changes of the character of this interesting element of land use. So, it is necessary to get down to new development strategies.
The SEP elaboration is very important also for the preparation and implementation of further development stategies of rural tourism and further protection of protected areas within the analysed territory. It can help also to answer on those basic questions:

- what number of tourists is suitable?
- what is the nature of the activities under which tourists partake?
- is needed new infrastructure provided by tourist planners at the site?
- are guidelines for appropriate behaviours issued to tourists?
- what have tourists been told to expect – what promotional promises have been made in any site advertising?
- what levels of fragility exist within the natural or build environments that host the tourists?

The development of the rural tourism is very interesting in the dispersed settlement landscape. Dispersed settlements and dispersed settlement landscape constitute an interesting landscape phenomenon with important cultural, historical, esthetical and environmental value. At present the dispersed settlements constitute a settlement type that suffers from the reduction of the population to the largest extent. For revival and sustainable development of rural areas the support of development of rural tourism and agri-tourism is conditioned by existence of agricultural land that is ecologically rationally utilised, appropriate residential function of existing flat stock and appropriate communication network. Relatively clean and attractive environment plays also an important role. As an example of such kind of used landscape is the area of agriculture enterprise of Vrbovce municipality.

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PERCEPTION OF THE AGRICULTURAL COUNTRYSIDE OF THE LIMBACH VILLAGE

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Abstract
Every space, area, territory or land register has certain potential made to be used of in an optimal way. This relationship is influenced by the nature qualities of the land and also by its history, which is interconnected with the current activities, practiced on it.The key element, that had and has the biggest influence on the countryside changes, is a human being.
In this work is presented the sociological research in the area of Limbach village. The target of this work was to find out , how local people look at the changes in the counryside and what are their suggestions to the existing or potential utilization of the village area.

Keywords: Sociological research, questionaire, local people, development, progress

Introduction
There is an inseparable bond between a human and the land (in any conseption). Many times people think, that land with all its parts, is their inexhaustible proprietorship. People are subjugating the land and by doing this, they are demaging it and increasing their demands on it. There is put permanent pressure on the development of the land, that becomes more important than preserving the orginal appereance of the area.
The target of this research was to find out, how people perceive the changes in the agricultural land of the Limbach village.
Human beings are demanding and selfish creatures, not seeing the consequences of their deeds.

Fig. 1: The view of Limbach from the slopes Malé Karpaty; Author: Andrea Grebečiová (July, 2010)

Delimitation and characteristis of the territory
Administratevily the Limbach village is situated in Bratislava Region, as a part of Pezinok district. Area of the cadastral area of Limbach village is 15,4 km2 and the number of inhabitants is 1 730 (until 13 december 2011).
The current landscape structure is consisting mainly of forest area and continuous cultures. Urbanisation and water areas are other importnat elements. North-eastern part of the territory, is a part of the Protected landscape areaSmall Carpathians. In the cadastral area of Limbach is situated a Nature reserve nad Šenkarkou, The Nature reserve Zlatá Studnička, The Natural monument Limbašská vyvěračka.
The area has the specific location where The Small Carpathians meet danubian Lowland (KRNÁČOVÁ ,ET AL., 2005) .

Methodological procedure
The purpose of this work was to find out, what people of Limbach village think of ganges in urbanistation and what are their ideas of the future development of this area. the way of farming of people living in the Limbach village. Also their imaginations about the future development of this area is included.

The research was based on questionnaires, filled in by the people living in the Limbach village, in the model area. The questionnaire was elaborated by the Institute of Landscape Ecology a department of the Slovak Academy of Sciences in Bratislava, on a model area of a town of Svätý Jur. (ŠTEFUNKOVÁ, ET AL., 2011: The Atractivity of the Small Carpathian Landscape with an Emphasis on the Historical Agrarian Structures and Biodiversity). One hundred questionnaires, representing 17% of the Limbach inhabitants, were proceeded for the sociological research.
Respondents were the local people. The questions were strictly defined and respondents were choosing from the list of possibilities/categories.

Results

1. Is the land of your village different from the the neighbouring ones?

	%
I do not know	7
Yes for sure	33
More yes	14
More no	33
No	13
Together	100

2. What do you think of the historical structures of an agricultural land in your village?

	% (V)
Improve the aesthetic quality of the countryside	25
Improve the atractivity of the district for tourism	25
Are exceptional by variety of the plant and animal species	12
They reflect the history of the economy in the countryside	37
They are the symbols of our village	46
They complicate the managemnt in the village	8
They do not have no importance	13
Others	1
I do not know	11

3. Do you think, that the variety of plant and animal species, on the historical structures of an agricultural land in your village, has changed over the time you remember?

The period of years	The diversity has much increased in (%)	The diversity has increased (%)	The diversity has much decreased (%)	The diversity decreased (%)	The diversity has not changed (%)	I do not know (%)	Together (%)
1950 – 1969	11	3	5	6	5	70	100
1970 – 1989	12	9	2	7	9	61	100
1990 – 1999	21	10	5	6	15	43	100
2000 – 2010	16	14	6	7	22	35	100

4. In your opinion, how active are the lower mentioned subjects in taking care of the environment in your village?

	Active (%)	More active than inactive(%)	More inactive than active (%)	Inactive (%)	Together (%)
Municipality	21	25	28	26	100
Association for Nature Conservation	44	30	18	8	100
Church	43	20	19	18	100
Political parties and movements	50	35	10	5	100
Inhabitants of the district	15	26	39	20	100
Individual agriculturals	19	31	34	16	100
Grange	29	34	24	13	100
Local Association of Individual Agriculturals	24	32	33	11	100

5. How much do you trust in mentioned subjects, from the aspect of optimal utilisation of an agricultural land?

	I trust (%)	I trust more than I do not trust (%)	I do not trust more than I trust (%)	I do not trust (%)	Together (%)
Municipality	19	24	25	32	100
Associtaion For Nature Conservation	5	21	33	41	100
Church	14	19	20	47	100
Political parties and movements	5	12	31	52	100
Inhabitants of the village	18	35	22	25	100
Grange	20	20	32	28	100
Individual agriculturals	21	28	24	27	100
Local Association of Individual agriculturals	19	30	28	23	100

6. How do you personally participate in the development of the village you live in?

	% (V)
By agricultural activities	8
Taking care of your dwelling in the form of a tooled garden, that has an aesthetic value	61
Taking care of the area of the dwelling by planting agricultural crops or keeping the cattle	36
By the conservation activity	13
By the educational activity	13
Others	2
I do not participate	28

7. Put a cross to the statement, that expresses best your opinion.

	I agree (%)	I agree more than disagree (%)	I disagree more than I agree (%)	I do not agree (%)	Together (%)
Competition is good, it stimulates people to work harder and develop their new ideas	44	37	15	4	100
Competition is harmful, awakens in people the worst	13	17	33	37	100
Long term hard work brings usually better life	44	38	10	8	100
In general hard work does not bring better life, it is more a mater of good luck and connections	21	20	35	24	100

8. Do you personally participate, or you participated on the process of agriculture on the historical structures of the agricultural land?

	%
Yes	31
No	69
Together	100

In the period	% (V)
1950 – 1969	8
1970 – 1989	16
1990 – 1999	21
2000 – 2010	13

9. Does somebody from your family participate, or participated on the historical structures of the agricultural land?

	%
I do not know	20
Yes	41
No	39
Together	100

In the period	% (V)
1950 – 1969	26
1970 – 1989	31
1990 – 1999	21
2000 – 2010	14

10. What do you think, in what extent interfers the agricultural exploitation of the land in your village?

	%
I do not know	47
Yes	41
No	12
Together	100

11. In your opinion, in what extent the mentioned options interfere the agricultural exploitation of the land?

	Interfere the most (%)	More interfere than do not interfere (%)	Do not interfere more than interfere (%)	Interfere the least (%)	Together (%)
Inapropriately set subsidies	38	48	6	8	100
Complicated administration of subsidies	43	47	5	5	100
The low market price of agricultural products	51	38	8	3	100
Unprovided sale	43	46	6	5	100
Insufficient support from local government	41	46	10	3	100
The The existence of natural reserves	26	25	24	25	100
Oustanding land ownership	40	29	23	8	100
Inapropriate construction of family houses	49	35	7	9	100
Inapropriately regulated the development of recreation	26	29	24	21	100
Inaccessebility of modern technologies	29	50	13	8	100
Negative attitudes of the inhabitants	20	42	24	14	100

12. How satisfied are you with job opportunities in your village?

	%
I do not know	21
Satisfied	7
More satisfied than dissatisfied	6
More dissatisfied than satisfied	23
Not satisfied	43
Together	100

13.In your opinion, what are the main advantages of the life in your village?

	% (V)
Proximity of sanctuaries	16
Quality of the environment	43
Uniqueness of the country	41
Customs and folk traditions	13
Cultural and archeological landmarks	5
Being part of an attractive region	50
Opportunities for recreation and sport activities of the inhabitants	35
Rich cultural and social life	18
Presence of the family	58

14. What is your perspectives about an ideal land use of the countryside of your village?

	% (V)
Preservation of the current use	39
The use of historical structures of agricultural land	29
Removing of historical structures of agricultural land	3
Increase in farmland	20
Increase in a forest area	30
Decreaes in forest area	4
Increase in the area of family housses	24
Increase in area of production facilities	17
Increase in sporting and recreational areas	57

15.In your opinion, in what extent should, the following activities develop in your village?

	Develop most (%)	Develop more than not develop(%)	Not develop more than develop (%)	Develop least (%)	Together%
Agrotourism	38	41	14	7	100
Tourism	42	41	12	5	100
Production and processing of medicinal plants	24	33	29	14	100
Sell of agricultural products from the yard	34	35	21	10	100
Spor-recreational activities	49	35	11	5	100
Educational activities	36	31	22	11	100
Making the village visible	50	40	6	4	100
Other forms of tourism	29	35	22	14	100
Traditional handicraft	19	47	33	1	100

16. personal data

Sex:

	%
Male	44
Female	56
Together	100

Age:

Age group	%
18 – 24 years old	14
25 – 34 years old	17
35 – 44 years old	19
45 – 54 years old	20
55 years old or older	30
Together	100

Number of children:

	%
0 children	29
1 child	23
2 children	26
3 children	15
4 children	4
5 children	2
6 children	1
Together	100

Marital status:

	%
Single	23
Married	44
Boyfriend/girlfriend	9
Divorced	14
Widow/widower	10
Together	100

How long do you live in this district?

	%
Less than 5 years	22
6 – 20 years	38
21 years and more	40
Together	100

Highest level of education:

	%
Basic education	12
Secondary education without A level	21
Secondary education without B level	42
Higher education	25
Together	100

Employment relationship:

	%
State employee	14
Employee of local government	8
Self-employed individual	12
Enterpreneur	13
Private sector employee	18
Unemployed	6
Maternity leave	4
Retired	14
Student	11
Together	100

Economical field you work at:

	%
Agricuture	10
Industry	12
Services	26
Forestry	3
Healthcare and socialcare	13
School system	17
Local government	9
Others	10
Together	100

What is the share of gross income from agricultural activities on the total income of your household?

	%
0 %	76
More than 0 % and less than 50 %	15
More than 50 % and less than 100 %	4
100 %	5
Together	100

Do you commute to another village or district?

	%
Yes	49
No	51
Together	100

Glossary:
% - mutual share of the answers (where sum = 100 %)
% (V) – share of answers for selected choice from all given choices (multiple choice)

Based on the questionnaire research, we can state in general, that local people do not have such a close relationship with their community. This may be based on the historical fact, that the village is mostly populated by non native inhabitants. (3rd of April, The Red Army occupied the Limbach village. The people's committee, consisting mainly from immigrants, was estabilished in the end of 1945. Based on The Potsdam Agreement, Slovak state deported the Limbach Germans to Germany. All the personal property, houses and land was seized and they had to leave their birthplace. All their assets were alloacated to people comming from Myjava, Stará Tura and Bošáca. Only mixed marriages and Slovak families were left.(http://obec-limbach.sk/o-obci/historia/)) Nowadays people are interested in Viticulture and Enology, that has a long tradition in the region. Most welcomed by the village would be support of self-government, better publicity and Sales support.

Conclusion

SUPUKA (1998) states, that the term land, was always related to the activities of humans on Earth. The main purpose of the land was demographic. It was associated with the place of birth of a person. It was often reffered to as county, territory, or land. The change of managemnet mode and utilization of certain areas has a positive impact on its surroundings. But also unsutable interference in the land can cause unreplecable changes. It depends only on the activity of a human and his abilities to differenciate between short-term interests from long-term, convinient and profitable exploitation of the countryside.

The answers of people from Limbach village were influenced in great extent by localization of the village (surroundings of Bratislava), with the current trends of the landscape. The absence of localpatriotism among many respondents. This research based on the questionnaire shows, the advantages but also the desadvantages, living in the village.

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POLLUTION EVALUATION OF THE BIHANKA RIVER IN THE CADASTER OF RÁCOVICE

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Abstract
This paper presents an evaluation of surface water pollution in Rácovice municipality, the Vysočina region. The study of pollution consists in the field survey of surroundings of the village and the Bihanka river to identify sources of pollution in the village. Bihanka has the most important function as a water source. Detailed research is also carried out at four sampling points of the river. Parameters of nitrate and nitrite nitrogen, pH and water temperature are evaluated every month, total phosphor, ammonia nitrogen and chemical oxygen demands are evaluated quarterly.
The quality of surface water in the village was subjected to an evaluation of the measured values in compliance with the Government Decree no. 61/2003 Coll. on indicators and values of allowed pollution of surface waters and wastewaters. After comparisons, it was found that the surface water is significantly polluted even above the specified standards. It was polluted by ammonia nitrogen and also by nitrate and nitrite nitrogen in winter.

Key words: water pollution, water resource, water self-purification ability, wastewater treatment.

Introduction

Water is essential for life as well as economic and civilization development. The significance of water in nature does not consist in its volume and quality only but also in the transfer of energy and substances in its cycle. Water participates in all important biological, physical and chemical processes as well as formation of the climate. With an increasing emphasis on ecological issues, great global attention has been recently given to water quality.
The Czech Republic has an important position in this due to its geographic location. No stream comes from abroad but many rivers with great significance for the European catchment area spring here. That is why it is important that the water flowing from our territories is not excessively loaded with anthropogenic pollution and activities performed on the streams comply with the nature and landscape protection. It is highly important to take responsibility for pollution of all waters and take all possible measures for their protection and maintenance. This means save water, not pollute and if pollution occurs, regularly monitor and purify water.

Research area

This paper focuses on the monitoring of wastewater and its effect on water quality in the Bihanka river, flowing through the cadastre of Rácovice village. The Bihanka springs north of Budkov in the form of three different streams: one of them is the Vedunka, at an altitude of about 555 m a.s.l. These streams connect in the cadastre of Budkov municipality into the above mentioned river. The river flows through the entire area, first in the south-eastern direction, then behind Rácovice it turns south-west. It has many other smaller tributaries. The valleys of the river and its tributaries are shallow and open, slopes get steeper downstream. The Bihanka is a small river with the maximum width of 1.5 m and the maximum depth of about 0.5 m. It is a left tributary of the Želetavka river, where it flows near Kostníky at an altitude of 370 m a.s.l. The area of the drainage basin is 73 km^2 and the river length is 16.8 km. There are about ten ponds in the basin of Bihanka and several of them are directly on the stream. There is Rácovice pond in the cadastre of Rácovice village, which serves for fishing and leisure activities. Further, a system of several small private ponds, also for leisure, have been built recently on the tributaries of the Bihanka.

Fig. 1: The current pond network in the village (Source: Mapy.cz, adapted by the author)

(Fig. shows newly built ponds in small circles, the original pond is in the big circle)

Material and methods

The field survey concentrated on the opening of the sewer network into the river in the cadastre of Rácovice and searching for the source of pollution. This was based on the conducted qualitative research within which samples of water were taken at four sampling points on the Bihanka river. The beginning of the monitored area was the no-name left tributary springing to the north in the forest that flows into the Bihanka in close vicinity of newly built reservoirs. The second sampling point was a place after this stream flows into the Bihanka. The third sampling point was below the dam of the village pond and the last point was at the end of the village behind the last opening of the village sewer network. The particular sampling points are presented in fig. 2.

Fig. 2: The monitored part of the river and the sampling points (Source: Mapy.cz, adapted by the author)

Results and discussion

There are several possible polluters on the flow of the Bihanka through Rácovice. One of them is erosion and washing of pollutants to the river from agricultural lands, where a possible source is usage of mineral and organic fertilizers. Organic fertilizers can also pollute the environment when they are stored in field collection points of dung as pollutants can leak into the surroundings as a consequence of improperly taken protective measures. Specifically, there is dung water (or silage water from a deteriorated silage), whose composition and high concentration of polluting substances, mainly nitrogenous, is highly aggressive and dangerous.

Another important potential polluter is the village itself, Rácovice. There are only two sewer branches in the village which take rainwater and wastewater from adjacent houses. The first sewer network opens into the left tributary of the Bihanka that flows through the village and into the Bihanka just under the dam of the village pond. The second sewer network opens into the Bihanka directly, a bit lower.

The rest of the village has solved the disposal of wastewater and rainwater by an independent piping leading from the houses directly to the Bihanka river (or its left tributary) or to the village pond. There are pipings from seven houses leading to this pond. These houses also have storage of dung and leakage of polluting substances is therefore possible.

The values of phosphor measured

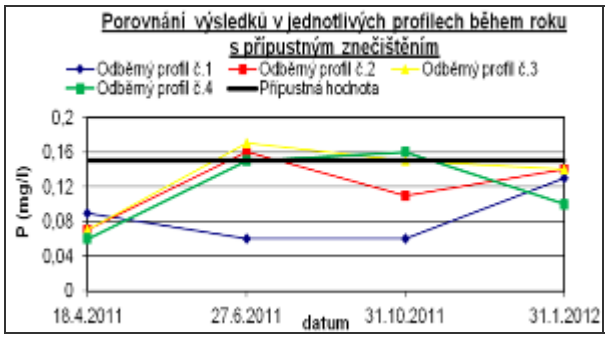

Fig. 1: Graph - Comparison of results with allowed total pollution by phosphor

As follows from the measured values, the acceptable value was exceeded only three times, by 0.01 up to 0.02 mg/l. This happened in summer months, when the concentration increases naturally. The excessive pollution by inorganic phosphor is caused by washing of mineral fertilizers from fields and meadows as well as by wastewater from laundries containing washing powders. The source of organic phosphor is animal waste, which only appears sporadically here.

Classifying the values to the Quality Water Classes, this river would be in the 2nd class, i.e. slightly polluted water, with a value up to 0.15 mg/l.

The values of N – NH_4^+ measured

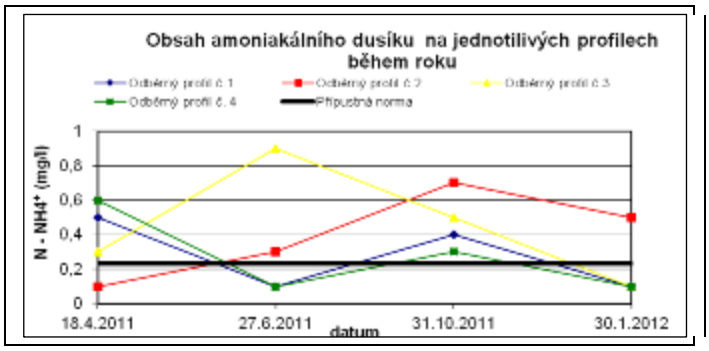

Fig. 2: Graph - Comparison of results with allowed pollution by ammonia nitrogen

The lowest values are achieved in winter until spring. The reason is the winter non-activity of agricultural lands and conservation of polluting substances in snow and ice. There is an increasing tendency between spring and summer, then the values slightly decrease but do not get under the set value. The worst result is found in summer at sampling point 3, which can be caused by the lack of precipitation in this period, a higher volume of wastewater and agricultural activities.

We can sum up that an important source of ammonia nitrogen in the village is wastewater, which flow into the recipient from the entire village, and partially also agricultural activities in the fields adjacent to the Bihanka river.

When comparing the measured values with Quality Classes of Superficial Waters, the river can be classified in the 2nd class again, as concerns ammonia nitrogen, except the measuring at the third point in June, where the pollution is greater. The limit for the 2nd class is 0.7 mg/l.

The values of chemical oxygen demand (COD) measured

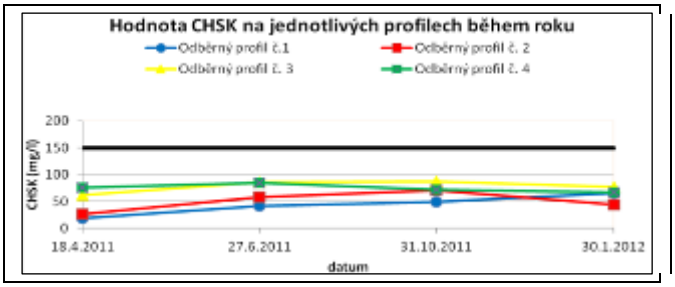

Fig. 3: Graph - Comparison of results with allowed value of COD

None of the samples exceeded the limit – this indicates a low organic pollution.

The values of nitrate nitrogen measured

Fig. 4: Graph - Comparison of results of nitrate nitrogen with the limits

The graph shows that the value of nitrate nitrogen is dependent on the season. In summer, the value is low and in summer it is higher. When measuring downstream, the value gradually decreases, at the end of the village the allowed limit is exceeded only in January, February and April. This can be explained by the self-purification ability of water, or the reduction of agricultural sources of pollution.

The values of the stream from January to June considerably exceed the limit and a remedial measure should be taken in the form of a wastewater treatment plant.

The values of nitrite nitrogen measured

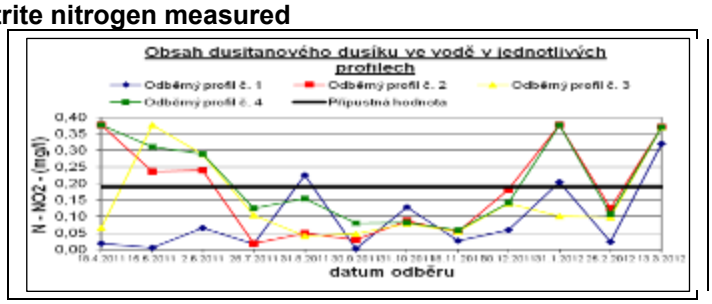

Fig. 5: Graph - Comparison of results of nitrite nitrogen with the limits

Again, there is an obvious dependence of nitrite nitrogen on the season. The worst results, or the exceeding of the limit of allowed pollution, were gained at the 2nd and 4th sampling points in April and January. The cause of these high values can be a higher volume of wastewater or thawing of ice and snow, where the nitrite nitrogen may have been trapped, further, flow of

thawed water from fields and the related washing of mineral and organic fertilizers that were supplied to the soil during the past growing season but the soil complex has not been able to bind them. At the same time, in early spring there is a lack of active plant vegetation in the fields that could use them for growth, and the nitrite nitrogen is thus released into the surroundings.

From the perspective of the particular sampling points, the lowest pollution is achieved in the 1st point where there is still no wastewater from the village and the content of nitrite nitrogen is at the lowest value, except August, October and January, when the pollution could be caused by a strong rainfall.

Conclusion

An important element in the field of pollution is the water self-purification ability, which is provided by newly built ponds in this area, which affect the quality of water flowing into the village. Inside the village, there is the village pond with a considerable share in the self-purification process. Its area and water retention time is relatively favourable for this process and there are obvious advantages, considering the proportion of the coming wastewater.

When the water leaves the pond, the self-purification ability is provided by large pools. There are several of them in the cadastre of the village. Besides the self-purification ability, the pools are also important for their retention and protective functions, they contribute to the natural biodiversity and they have an influence on the better aesthetic value of the landscape.

To meet the legislation demands concerning the village wastewater treatment, there is a project for a sewage pumping station and the finishing of the force main in the wastewater treatment plant Třebelovice. For financial reasons, this version is unattainable for the time being. Therefore, also other ways of wastewater treatment in the village should be considered, e.g. construction of a vegetation wastewater treatment station, which could be financially more affordable.

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POSSIBLE LEISURE USE OF A PROPOSED RESERVE ZBOJNÍK

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Abstract
Territories with special protection have a great potential of leisure use. However, it is necessary to find the ideal balance between landscape and nature protection and the possible utilization for leisure activities so that none of these sides is damaged essentially and irreversibly. Therefore, a territory with special protection needs to be connected to a network of all types of leisure roads sensitively and sensibly.

Key words: Chřiby, Nature Reserve Zbojník, leisure activities

Introduction

The Chřiby – a highland with a large forest complex, dividing the flat landscape along the Morava River and the area of "Small Haná" – has been a significant point in the landscape of Moravia for ages. It was also chosen as a strategic and defensive site and the castle Buchlov was built there. The Chřiby was pronounced a nature park in 1996 for its typical landscape character. This highland is also important as significant biotopes and organisms appear there, e.g. herb rich beech forests, west Carpathian oak-hornbeam forests or *Rosalia longicorn*. For these reasons, the Chřiby became a part of NATURA 2000, Europe's important site Chřiby.

Location of the territory

The explored site of the proposed nature reserve Zbojník is located in the region of Zlín, district of Uherské Hradiště. The activities of a municipality with extended powers and a municipality with authority is performed by Uherské Hradiště, cadastral area Buchlovice.

Overlapping of the explored area with other protected areas

The explored site is located in the territory of Nature Park Chřiby and there is also the territorial system of ecological stability going through this area.
The Nature Park Chřiby, pronounced in 1996, has large natural values as well as cultural sites, such as Buchlov castle, St. Barbara's Chapel or a ruin of Cimburk castle. From the perspective of flora, the area of the Chřiby Highland is highly ecologically stable area with a high percentage of forest land with prevailing natural species composition (oak-beech and beech forests). Anthropogenic influence is mainly seen at the foot of the highland, where the original broadleaved forests have been turned to coniferous, mainly spruce stands. The territory of the nature park has many areas with special protection. There are sunny grassy slopes with thermophilic plants where a lot of protected species of the Orchidaceae family and rock formations on the ridges of the Chřiby. As regards fauna, this is a territory with relatively balanced ecological conditions, which is manifested in the species variability of fauna with a high proportion of species with special protection (e.g. Black Stork - Ciconia nigra, European Honey Buzzard - Pernis apivorus, European Stonechat - Saxicola rubicola, Eurasian Wryneck - Jynx torquilla, European Nightjar - Caprimulgus europaeus, Eurasian Eagle-Owl - Bubo bubo, some species of bats, and finding of Mantis religiosa from the Invertebrates is also worth mentioning)[1].
The other protected area system here is the territorial system of ecological stability (TSES). The web site of the National Geoportal INSPIRE tells us that the explored area is crossed by a regional biocorridor: Buchlov Forests - Boršice, which lies in close vicinity to superregional biocentre: Buchlov Forests. According to the web pages of Forest Management Institute (FMI) Brandýs nad Labem, the explored area includes three local biocentres: "Nad dlouhou řekou", "V nivě", and "Proštěpená". Further, there is a local biocorridor connecting the superregional biocentre Buchlov Forests with the local biocentres V nivě and U Smraďavky. Moreover, there is a regional biocorridor connecting the superregional biocentre Buchlov Forests with the local biocentres Nad dlouhou řekou, Proštěpená, and U Smraďavky.

From the point of view of NATURA 2000, the site is located within Europe's important site Chřiby (CZ0724091).

Procedure

a) gaining the available data and information about the territory

We gained the available information about possible leisure use of the specific site in the Nature Park Chřiby. Further, this issue and the current needs of the site were discussed with an expert (Ing. Zdeněk Zálešák from the Buchlovice Forest Administration).

b) field survey

The field survey was conducted continuously starting in July 2010.

c) data processing

The data processing included processing of the gained information, creating of maps and photo documentation.

History of the area utilization and the essential positive and negative effects of human activities in the past, present and near future

a) nature protection

The territory of the Nature Reserve Zbojník is a part of Nature Park Chřiby, but no active protection has been applied.

b) forest management

Thanks to close to nature forestry used in the past and the present, the forest stands on the site of the proposed Nature Reserve Zbojník are ecologically stable and valuable as far as nature protection is concerned. To maintain a natural character of the forest, it is suitable to leave wood in the particular stands to decay. However, this contradicts the great need of locals (mainly weekendhouse keepers) for firewood; they regularly go to the surrounding forests to gather wood. That is why there is an obvious difference in the stock of lying rotten wood. The forest stands that are easily accessible and connected to forest roads have nearly zero stock of lying wood. The stands in cliffs, more difficult to access, not connected to local roads, have nearly 100 percent stock of lying wood. Therefore, it will be easier to leave wood to rot in the stands that are further from important forest roads.

c) game management

The natural regeneration in the territory shows signs of a great pressure of game. This is most manifested in seed years. For a successful regeneration of the stands it will be necessary to fence the gap felling plots of natural regeneration.

d) leisure and sports

There are marked trails for hikers and horse riders in the territory of the Nature Reserve Zbojník. Cycling is also possible and in winter cross-country skiing. Rock formations on the site are used by climbers. Another group of tourists coming here are mushroom pickers. In the future, it will be necessary to take measures to prevent collisions of leisure interests and nature protection (e.g. there is the risk of falling branches). A suitable form of explanation could be information boards that positively affect opinions of tourists and locals. Further, a mapping and updating of all marked trails (for hikers, cyclists and horse riders) is recommendable; not only those going through the Nature Reserve Zbojník but also those leading over the Nature Park Chřiby.

Results

The site was assessed from the perspective of historic utilization with effect on the present. Further, the essential positive and negative influences of human activities in the past, the present and near future were evaluated including nature protection, forestry, and game management on the site of Zbojník. Attention was then focused on the leisure potential in the proposed nature reserve Zbojník. It was found out that there are marked trails for hikers and horse riders. These can also be used for cyclists and cross-country skiers in winter. The current official and unofficially used leisure trails going through the site were mapped and proposed in the map. Within this activity, an existing relaxation place was found and information boards were proposed at several places of the explored site. Rock formations on the site serve mainly for climbers. Therefore, it would be suitable to create a new relaxation point near the Karlova skála rock as this place is frequently visited. Another type of leisure activity on the site is mushroom picking.

Discussion
In our opinion, the explored area is suitable for active management in the form of controlled economy (extensive management), or active searching for the ideal balance between forest management, nature protection and leisure use.
A sensitive and elaborated expansion of the existing trails by new paths, which are currently used unofficially, will provide tourists with less known places and areas that are worth seeing and using for leisure. However, it is always necessary to consider the extent of the leisure use of the site and its leisure capacity so that none of the involved sides is put at risk. Therefore, it will be necessary to take measures to prevent collisions of leisure use and nature protection (especially by a clever choice of the network of marked trails).

Conclusion
The aims of this study were to evaluate the leisure use in the proposed Nature Reserve Zbojník and to assess the care provided to small-area territories with special protection within Europe's important sites. The specific approach to protection is mainly dependent on the size of the area, the level of its preservation and the importance of the area from the perspective of protection.
A territory suitable for protection of nature biotopes was proposed and delimited. There are herb rich beech forests, west Carpathian oak-hornbeam forests and acidophilic beech forests, i.e. these are all protected. The network of marked trails in the territory was evaluated and mapped and places suitable for information board were proposed.

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Appendices

Fig. 1: Herb rich beech forests in the territory (7. 11. 2011)

Fig. 2: West Carpathian oak-hornbeam forests in the territory (7. 11. 2011)

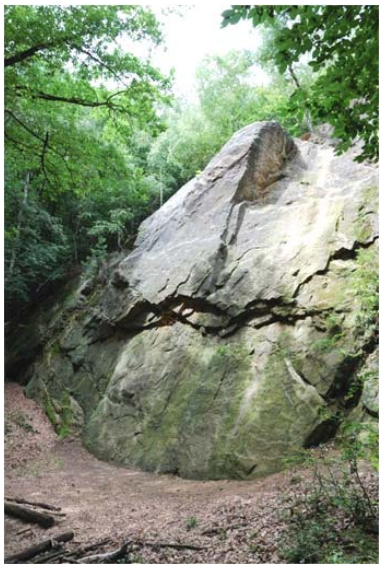

Fig. 3: Rock formation Zbojník in the territory (5. 7. 2011)

Fig. 4: A part of the rock formation belonging to Karlova skála rock in the territory (5. 7. 2011)

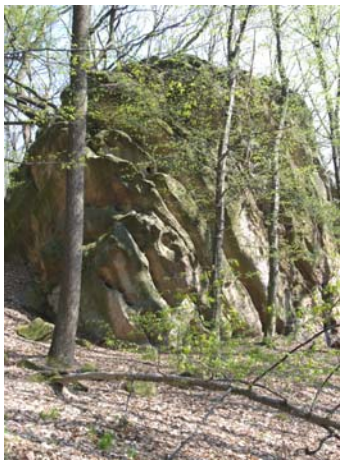

Fig. 5: A part of the rock formation belonging to Karlova skála (18.4. 2012)

Fig. 6: Forest roads and paths on the site are often used as marked or unofficial riding trails (18.4. 2012)

Fig. 7: Nature Reserve Zbojník – proposal of the site and protective band

Fig. 8: Degree of originality of forest stands based on a scale of stand type originality based on Vyskot et al., 2003

Fig. 9: Nature Reserve Zbojník – marked trails and the proposed placement of information boards

PRACTICAL EXPERIENCE IN THE DESIGN OF RECREATIONAL TRAILS IN THE ŽĎÁRSKÉ VRCHY PROTECTED LANDSCAPE AREA

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Abstract
The paper focuses on practical experience in aligning and designing recreational trails for hiking in areas with increased protection of the environment – particularly, in the Žďárské vrchy protected landscape area near the town of Nové Město na Moravě. The locality is in peri-urban woodlands, and is significantly affected by tourism. The routing of the trails has to be projected sensitively with the aim to minimize negative impacts on the environment in the protected landscape area. The trails should be designed vertically and horizontally to follow the current terrain configuration. Natural construction materials should be preferred in the protected landscape area. Further, the paper discusses the design of complementary facilities such as information boards, rest stops, and amenities for active leisure.

Keywords: active relaxation, hiking, horizontal and vertical routing, natural materials in construction

Introduction

Recreation is a form of relaxation or leisure-time activity that contributes to the replenishment and development of an individual's physical and mental energy. It provides a change of environment, counter-balances the monotonous and demanding work, and contributes (often in direct contact with nature) to a feeling of overall well-being. If accompanied by suitable hobbies and interests, recreation provides inner satisfaction, enriches the intellect and contributes to personal growth.

The Žďárské vrchy area is characterized by a harmoniously balanced cultural landscape with a significant representation of natural ecosystems. It is, for the most part, a wooded area with numerous river springs and lake systems. It is an area in which both sport- and leisure tourism have been developing rapidly in recent years. The development of tourism goes hand in hand with the need to complete the infrastructure.

The project aims at proposing three recreational trails with a total length of 1444 m. The trails are located in the peri-urban woodland to the north-west of Nové Město na Moravě. The woodland is listed in the Special-Purpose Forest category, and is part of the Žďárské vrchy protected landscape area. Also in the area there is a cross-country skiing site managed by the sports club in Nové Město na Moravě, which annually hosts major sporting events. The territory is within walking distance from the Nové Město town centre, about 1.5 km away.

The project documentation for the trails was commissioned by the Municipal Authority of Nové Město na Moravě. It is a single-stage project documentation for planning and building permit proceedings, and for construction [10, 11, 12, 13, 15]. The project aims at complementing and improving the existing network of hiking trails. The project also outlines the development of complementary facilities and related infrastructure – information boards, rest stops with benches, as well as various amenities for active leisure.

Materials and methods

The project design is based on the Water Management Map of the Czech Republic (1:50 000), the Base Map of the Czech Republic (1:10 000), the Cadastral Map of the Czech Republic, orthophotos, forest management plans and relevant forest growth maps.

Part of the preparatory works was a bio-geographical study of the locality and of the technical infrastructure in the proposed area [2]. Further, a field research took place in order to determine the soil excavation class. The earthworks were classified in excavation class 4.

Geodetic measurements of the area were performed as part of project preparation. Planimetric measurements were done using the Uniform Trigonometric Cadastral Network reference system, and hypsometric measurements using the KHD (Kronstadt Height Datum) system. The project was designed using AutoCAD Civil 3D 2012, which is a comprehensive software suite for project preparation and management, and supports a wide range of civil engineering tasks. The application's program code is based on an object-oriented architecture. Thanks to

this, dynamic relations exist between the individual project entities, which means that related objects are properly updated after any modification [1]. A basic prerequisite for utilizing the application tools is the creation of a digital terrain model (DTM) in the form of a TIN (triangular irregular network), within which the construction will be designed. Numerous types of data can be used to create the DTM; for the trails project, geodetic point coordinates were chosen.
The project complies with the standard ČSN 73 6110, Design of Urban Roads, with regard to the use of traditional technologies in the construction of forest road networks and to the maximum possible use of natural construction materials [3, 4, 5].
The individual pieces of equipment were modelled and visualised using SketchUp PRO 8. The program meets the requirements for precise modelling and allows verifying the functionality of the individual components, including details such as construction joints (see Fig. 1). The program output can directly be used in the project documentation [7].

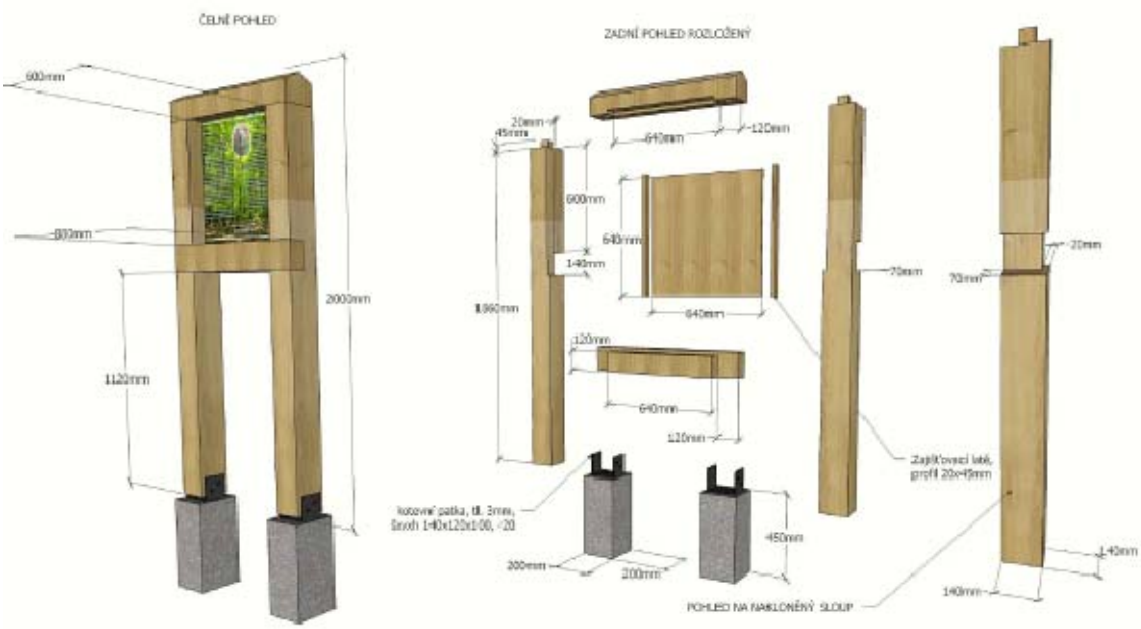

Fig. 1: An information board (SketchUp PRO 8).

Results
The construction of the trails will help better organize tourism in this popular area, and will relieve the current strain on the woodlands. The trails are projected along existing unpaved forest paths, whose current condition does not allow proper use for tourism and leisure. The unpaved surface is very uneven and waterlogged in places. Due to this fact the paths are difficult to walk on, especially for the elderly and for families with small children. When levelled and paved, the trails will fully become “D2 roads” – i.e. roads with motor vehicle operation prohibited, according to ČSN 73 6110, Design of Urban Roads [5, 9].
According to Act no. 114/1992 Coll., on nature and landscape protection, recreational use of protected landscape areas is permitted, provided that no damage is done to natural values [14]. This is why the project designers strive to minimize undesirable interferences with the existing natural environment, and to create conditions for making the tourist attractive area accessible to the general public while, at the same time, observing the principle of environmental friendliness.
The directional and altitudinal layout of the trails is designed to respect the existing terrain configuration. In the vertices of the tangent polygon and at the angles of the vertical axes of the trails, circular arches were projected whose radius optimally follows the terrain. Thus, horizontal and vertical diversity is preserved in the routing, so the trails do not lose attractiveness for hikers. Another benefit of this routing is that there are very short (or even no) digging slopes or embankments, and that the construction of the path network requires minimum earthworks [8].
The projected trail width is 1.8 m. Drainage will be ensured by a one-sided 3% diagonal decline of the road surface and ground. The structural composition of the trails has been designed based on the expected function and strain in the individual seasons of the year, with motor

vehicle operation excluded. In order to incorporate the construction sensitively into the woodland, and to use natural building materials, a non-solid road surface was proposed made from two unbound layers of gravel, 30 cm in thickness. On levelled and solidified ground, an intermediate layer of paving grit (32–63 mm graded), 30 cm in thickness, will underlie and protect the road surface. The surface will be paved with mechanically consolidated aggregate, 14 cm in thickness [6].

Although the trails will be constructed in a terrain with a slight diagonal slope towards the trail axis, there is no plan for water drainage through ditches along the sides of the trails. This is because the idea is to minimize impact on the water system in the surroundings. The absence of the ditches will prevent the concentration of surface drainage water along the trails. Further, it will not be necessary to build costly pipe culverts to drain water under the path. Neither will it be necessary to adopt technical measures for dissipating energy concentrated in the water, and for distributing water back into the terrain after it leaves the culverts. A basic drainage is provided by the diagonal decline of the trail, which will ensure a smooth transfer of non-concentrated water streams running from adjacent hillsides.

Fig. 2: Longitudinal and transverse drain (AutoCAD Civil 3D 2012).

In several places along the existing forest paths, there are short sections with waterlogged local depressions. For these places, longitudinal and transverse drains have been projected (Fig. 2). The drains are rectangular in cross section, with a 100 mm perforated drainage piping laid at the bottom. The drains are filled with 16–32 mm graded paving grit along the piping, and 63–125 mm graded crushed rock. The casing of the drain will be made from geotextiles, to perform a separating, filtering and drainage function. The drains are located in the longitudinal direction beyond the upper edge of the road surface, and they slope towards the transverse drain, which ensures water drainage towards the embankment slope.

Fig. 3: A shelter (SketchUp PRO 8).

Various facilities will be provided as part of the recreational trails project. The design incorporates rest stops with tables and benches, shelters, litterbins, playground equipment, information boards and signposts (Fig. 3, 4). All these facilities are planned to be made from durable natural material – oak timber. Both the trail surface and the rest stop grounds are paved with (Type 1) unbound mixtures. The location, number and size of the rest stops have been designed to minimize impact on the environment. The selected material shows a high resistance to sunlight as well as to heat and humidity fluctuations. The durability of the wooden

elements is ensured by a deep impregnation and a subsequent oil treatment of the surfaces. The metal elements, used for anchoring the equipment in concrete footers embedded in the ground, are hot-dip galvanized to protect them against corrosion.

Fig. 4: A table and a bench (SketchUp PRO 8).

Tab. 1: The list of rest stops.

Trail	rest stop	km	area	equipment
Recreational trail “K Hubertovi” *(km 0.000 00 – 0.233)*	U chaty Sylvie	0.000	24.4m^2	2 benches 1 litterbin
	U sv. Huberta	0.230	21.2 m^2	2 benches 1 table 1 litterbin 1 information board 1 signpost
Recreational trail “Okolo Černé skály” *(km 0.000 00 – 0.699)*	Playground	0.000	230.4 m^2	5 benches 2 litterbins 4 playground toys
	U buku	0.006	81.1 m^2	shelter 4 benches 1 table 1 litterbin 1 signpost 1 information board
	U Černé skály	0.380	57.1 m^2	4 benches 1 table 1 litterbin
	Na konci stezky	0.678	25.2 m^2	2 benches 1 litterbin 1 signpost
Recreational trail “U koupaliště” *(km 0.000 00 – 0.510)*	U koupaliště	0.000	21.6 m^2	shelter 2 benches 1 table 1 litterbin
	U potoka	0.185	6.8 m^2	1 bench

Discussion and conclusion

At present, protected landscape areas, leisure areas and peri-urban woodlands are becoming more accessible to tourists, mostly utilizing the existing road network, with new roads built where necessary. Usually they are mixed-purpose roads, designed not only for tourism (hiking, cycling, horseback riding) but also for cars (used by forest management, suppliers, etc.) The individual users of these roads and paths (for instance, hikers and bikers) face a risk of collisions and injuries, where hikers in particular are in danger. Most single-purpose tourist trails constructed these days are cycling and MTB paths, horseback riding trails, roller skating tracks, etc. Hikers are often neglected, despite hiking being the most environment-friendly form of tourism. Hiking trails require minimum construction work and have little impact on the landscape – their width is negligible (recommended width is 1.5 m); they respect the terrain without the need for extensive earthworks; their surface is made from simple natural materials (gravel, wood). The trails can be suitably complemented by other facilities, such as rest stops with benches, educational boards, landscape view points, etc. They are suitable for all generations, from families with young children to elderly people.

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[11] Decree no. 268/2009 Coll., on technical requirements for construction
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[15] Act no. 183/2006 Coll., on town and country planning and building code (Building Act)

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PROPOSAL OF EDUCATIONAL TOURISTIC POLYGON FOR VISITORS WITH DISABILITIES IN PROTECTED SITE BOROVÁ HORA ARBORETUM

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Abstract
In article we present the proposal of educational touristic polygon in Protected Site - Borová Hora Arboretum for people with limited mobility - disabled people in wheelchairs. Will be designed a small constructions, relaxation-resting zones, orientation signs and education posters. Education will be focused on these topics: tree species forest communities; forest as an ecosystem; functions of the forest ecosystems; forest vegetation zones and climate changes; tree species in Slovakia and their ecological requirements; forest tree species and their protection; cognition of basic tree species; interesting facts about trees of the Slovakia and of the world. Training will be realized at selected places - marked points through educational panels and demonstration of collections of the Borová Hora Arboretum. Will be used: theoretical and practical methods of teaching by experiencebased education in nature; educational aids placed in the natural scenery; authentic examples; professional interpretations and practical presentations. The total length of the proposed polygon for visitors with disabilities is 2,605 km. The time of duration for passing of touristic polygon is 4 hours including educational stopping. The polygon is proposed in accordance with the technical standards for wheelchair users.

Key words: education in nature, persons in wheelchair

Introduction

„We have a moral duty to remove the barriers to participation for people with disabilities, and to invest sufficient funding and expertise to unlock their vast potential… It's my hope this century will mark a turning point for inclusion of people with disabilities in the lives of their societies."
Prof. Stephan Hawking

Is estimated that 1 billion people, which represents 15,6% of the human potential on the Earth, that 1 of 7 people in the World have a disability. Thereof 110 until 190 million of adults has a difficult functional failure (World report on disability (http://www.endexclusion.sk). Hudecová (2011) provides information that the number of chronical and civilizational diseases is increasing and is a realistic assumption that it will increase the number of severely disabled people and disability pensioners. (http://peniaze.pravda.sk). In the Slovakia increase the number of people with severe disability on more than 160.000 of pensioners and disabled to nearly 216.000, according of information of the Social Insurance Agency in year 2010. Total number disabled people is even higher, because not everyone is in evidence and has access to information about the potential benefits and contributions of the social system. Statistics of Word Health Organization (WHO) in 2010 gives an indication that in Slovakia are total health expenditure 8.8 % of gross domestic product (GDP) which are the total expenditure 2.060 $ incurred on 1 capita (http://www.who.int/countries/svk/en/). There is no question, that the number of vulnerable people is increasing and they can easily find themselves in a group with disabilities, because between poverty and disability is a clear connection. The aim of the solving issue is the creation of proposals for the realization of whelchair access of educational-touristic route in Borová Hora Arboretum (The BHA), creating space for education in nature through experiential education and involvement in leisure time activities of people of all ages with disabilities, especially disabled people in wheelchairs.

Material and methods

The Borová Hora Arboretum

The BHA within of the geomorphological division of Slovakia belongs to the Slovenské stredohorie in the sub-province Vnútorné Západné Karpaty and in to geomorphological unit of the Zvolenská kotlina. Its southwestern part has the character of upland. Height differences of the area are in the range of heights from 291 to 375 m asl. The climate is warm and moderately (slightly) humid, with the average annual temperature of 8,8°C, with the average annual precipitation 640 mm. It belongs into the group of forest types „Fageto-Quercetum" and of 2nd forest vegetation zones. BHA with area of protected site (PS) 455.000 m^2 (with total area of 478.908 m^2) belongs within the State Nature Conservancy of the Slovak Republic in the region

of the Banská Bystrica under the administration Protected Landscape Area of Poľana (http://uzemia.enviroportal.sk). As a Protected Site was declared by the Ministry of Culture of the Slovac Republic of the No. 2659/1981 - 32 with the effect on 1 May 1981 with the inclusion to the 3rd category of protection. The subject of the protection is: "Protection of the natural heritage of the genetic composition of tree species of Slovakia in their wide of individual variability and on the purposes of the scientific research, education and cultural-educational goals". The arboretum founded prof. Pravdomil Svoboda (1965-1969) which started first planting of trees in the spring 30th March 1965 on the area of 28,38 hectares. In present time is organizational part of the Technical University in Zvolen with access to the public. By focusing is oriented on the autochthonous dendroflora with particular attention on tree species of Slovakia. It is unique and exceptional facilities of national importance excess of the borders of Slovakia. We have a valuable tree species of morphological and geographical variability. In our collections we registered 575 forms and cultivars of conifers and 596 forms and cultivars of deciduous trees what represents approximately 1600 taxonomic units, at present. As reported by Lukáčik (2009) the collections are intended on the educational, scientific and research purposes with accent on forestry dendrology. The focus of the collections is important not only for study the variability of trees, protection their biodiversity but also for their future using. We have the collection of roses with more than 900 taxonomic units and the collection of cacti and succulents in the number of 700 taxonomic units. Professional, sociable and cultural significance our the collections is unquestionable. Just such facilities can to help disabled people to overcome of ourselves and phenomenon of „barriers".

World Health Organization
The World Health Organization published a "World report on disability" in partnership with the World Bank (The World Bank) and the Convention on the Rights of Persons with Disabilities (CRDP) which became effective in May 2008. In these documents reinforces the perception of disability in human rights dimension as a development priority. Therefore the World Health Organization calls for overcoming barriers and to inclusion.

Disabled access for wheelchair users is limit condition for entry into the area of the proposed educational-touristic polygon. We consider important designation of parking places for "people on the wheelchair" at the beginning of the entry into the area. The other important criterias of planning routes in the outdoor environment is: surface of routes, length of route, longitudinal and cross gradients of route, duration of activity, technical data of wheelchair and other technical standards. Is generally known axiom: "What is appropriate for people with disabilities is also suitable for healthy people - for us who it we have in life a lot of easier."

The criteria of outdoor polygons of routes for people in wheelchairs. Based on the empirical experiences of wheelchair users which are using touristic polygons in nature, we came to the following data: surface of the route should be in principle hard or reinforced and is acceptable forest road or field path; obstacles on the route (depth / height) should be > 8 cm (for electric wheelchairs is acceptable limit to 10 cm); the maximum increase or decrease should not exceed 10% (for electric wheelchairs - max. 15%, forest road has of max. 12%); the maximum length of the section with longitudinal gradient road 10% - 15% should be < 150 m; ideal length of route should not exceed 4 km of the planned half-day activity; the maximum cross slope should be < 3% (for electric wheelchairs < 5%); maximum gradient at rest places for potential rotation of wheelchair users should be < 0,1%; minimum width for safe passage for wheelchairs should be > 90 cm; the minimum space for safe passage of two wheelchairs should be > 180 cm; space needed to rotation of the wheelchairs should be limited to a minimum diameter of circle = 1500 mm (data is calculated on the based of size of massive electric wheelchair - Orthopaedics - Tourning - 928).

Results
Situation and slope condition of the proposed educational and touristic polygon in PS BHA for the disabled people are processed in the Table 1, including educational activities, distances between stops, etc. Total length of the proposed polygon is 2,605 km, which we can walk in wheelchair approximately for 4 hours. Number of stops and educational issues at stands is 10. We assume to 15 minute educational cessation at individual stations route. At the beginning and end of the route is available sanitary facilities for disabled people in wheelchairs. A summary of the basic characteristics access of people on the wheelchairs and

limits on the route are presented in Table 2. We illustrat of the mape route of proposed educational – touristic polygon in BHA for disabled people in the wheelchair in Figure 1 and longitudinal profile of the route In Figure 2. We present example of bituminous roadway in Figure 3 and illustrative photo of PS BHA in Figure 4, 5.

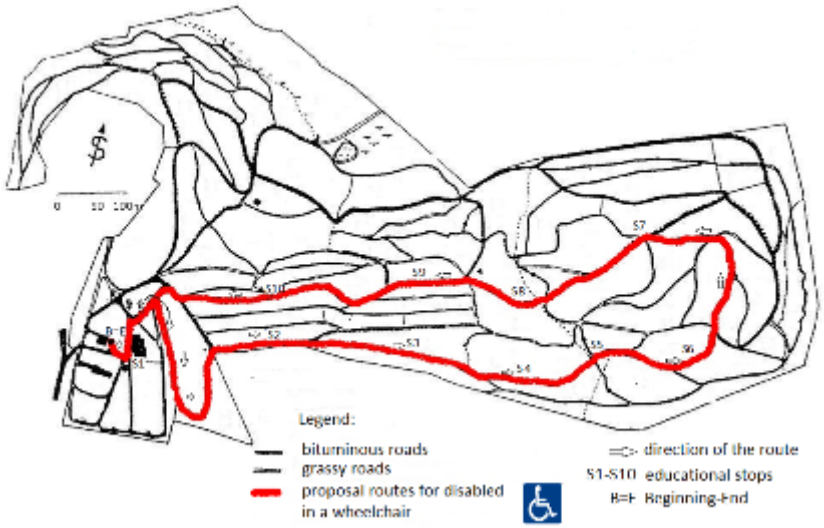

Fig 1: Map route of educational and touristic polygon in Borová Hora Arboretum for visitors with disabilities

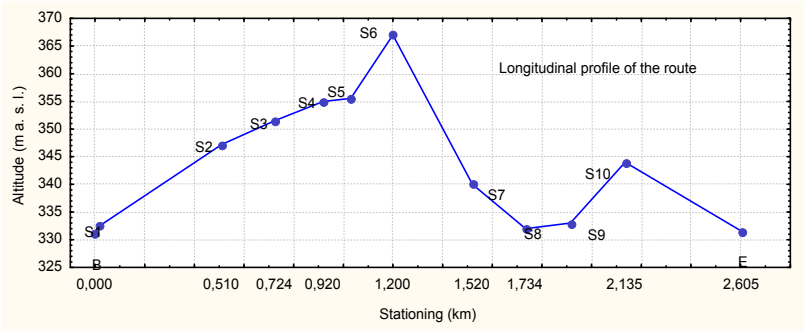

Fig 2: Longitudinal profile of the route of educational and touristic polygon in Borová Hora Arboretum for visitors with disabilities

Characteristics and thematic focus of educational of stops:
The educational process will realized on 10 identified stops through of the10th visual panel. The final proposal will solved in the context with the needs of "people in wheelchairs" including proposal of educational panels. We dealt with the theme of educational – touristic polygons in nature also in our other proposals in the past: Jakubis, Rusko (2003), Jakubis, Jakubisová (2010, 2012), Jakubis (2011). Educational topics for leisure time - education have been designed in accordance with special focus and mission of the BHA:
S1: History of forestry, formation and role ABH; S2: Forest as an ecosystem; S3: The functions of forest ecosystems; S4: Forest vegetation zones and climate ganges; S5: Wood species is a living organism; S6: The main tree species in Slovakia; S7: Wood species and their ecological requirements; S8: Forest Protection and injurious factors; S9: Basic types of trees and their cognition; S10: Interesting facts about trees in the Slovak Republic and in the World

Tab. 1: Characteristics of the polygon for wheelchair users in the Borová Hora Arboretum
Explanatory notes to Table 1: S - start of the route, E – end of the route

Stand	Stat. (km)	Altitude (m a.s.l.)	Topic of the stand	Distance (m)	Max. grad. (%)	Surface of route
S	0,000	331.20	--	--	--	--
S1	0,018	332.50	History of forestry Formation and role of Arboretum Borová hora	18.00	7.22	 Bitumen road
S2	0,510	347.20	Forest as an ecosystem	492,00	3.16	
S3	0,724	351.50	Function of forest ecosystems	214,00	2.01	Obstacles of the route not exceed the height/depth of 0 cm
S4	0,920	355.00	Forest vegetation zones and climatic change	196,00	1.79	
S5	1,030	355.55	Tree species as a living organism	110,00	0.50	
S6	1,200	367.00	The main tree species of the SR	170,00	8.74	Cross slope of the route is max. 2 %
S7	1,520	347.00	Ecological requirements of tree species	320,00	-13.51	
S8	1,734	332.00	Forest protection and deleterious factors (abiotic, biotic, anthropogenic)	214,00	-3,74	The lenght of maximal fall does not exceed of 150 m
S9	1,815	333.00	Recognition of basic tree species	181,00	0.55	
S10	2,135	344.00	Interesting facts about trees in the SR and in the world	220,00	5.00	
E	2,605	331.20	--	470,00	-7.5	
				Total lenght of the route: 2,605 km		

Tab. 2: Characteristics of the route

Summary of the characteristics of the route for wheelchairs:	**Data**
Total length of the route on the bitumen road:	2,605 km
Maximum longitudinal slope (fall) between stands S6-S7:	-13,51 %
Difficult to overcome the trim of the section between:	Z1-Z2, Z6-Z7
The maximum cross slope of the bitumen road:	2 %
Max. height / depth of constraints on the bitumen road:	0,08 m
Estimated time of the presentation on individual stands:	0,25 h
Estimated speed of the wheelchair users:	1 km/0,6 h
Estimated time of the route without stopping:	1h 34 min.
Estimated time of the route with stops of 15 minutes at each stands:	4,06 h
Estimated rounded time of the route with educational stops:	4 h

Fig. 3: Example of bituminous roadway

Fig. 4: Decorative forms of spruce (Picea abies [L.] Karst.)

Fig. 5: Scenery and view on the pavilion of ABH

Conclusion

"To achieve the Millennium Development Goals and the goals set after them, we have to support people with disabilities and remove barriers that prevent to have their voices heard."

Margaret Chan, Director-General of WHO

Summary

In this article we deal with education of people with disabilities and with proposal of touristic polygon in Protected Site Borová Hora Arboretum. Informal leisure time - education in nature through education "by experience" (outdoor education) can be so motivating that this activity can to escalate into a serious professional interest and self-realization of the individual of person. Adaptation to the environment and movement in space are key conditions for access disabled people in wheelchair and a starting point for their educational and other interests. The proposed polygon has 2,605 km, 10 educational of stops and is suitable for half-day leisure time - activity for people on the "wheelchairs " of all ages. Educational topics are focused on learning about trees and their importance in nature and for people. Education will be done through of the educational panels placed at each stops and of the professional guides. We prepared of possibilities of access, parking options, plan route of polygon, longitudinal profile of the route, learning topics, description of the route and other interesting information about the facilities. The visitors will have the opportunity to order of touristic guide along the route and the possibility to study of tree species through authentic demonstrations of habit, leaves, buds, seeds and fetuses. We will provid through websites informations about activities and events for disabled people in wheelchairs (www.arboretum.sk).

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PUBLIC RECREATION AND LANDSCAPE PROTECTION – HAND IN HAND WITH VISITOR MONITORING

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Abstract
Policy makers and managers of natural areas have to deal with competing socio-economic and environmental interests. The planning and management of these areas depends on accurate and sufficiently detailed information. Data from long-term monitoring are essential for assessing visitor impact on natural resources, facility planning, budgeting, calculating the economic contribution of tourism, and estimating the economic value of recreation experiences. In this paper we present an overview of different visitor monitoring techniques and the way they can be used drawing upon our experiences with monitoring projects in different areas in the Netherlands. We show that long-term monitoring is the basis, and that a suitable approach depends on the questions at hand, the resources available and the characteristics of the area.

Key words: Visitor management, Methods, Techniques, Counting, Traffic flows

Introduction

Natural areas and in particular National Parks are important tourism destinations in the countryside and the car is a popular means of transport for these trips. Many of these areas are fragile and a large number of visitors may threaten natural and recreational values by crowding (Manning et al. 1999), congestion (Cullinane, 1997) and parking problems (Dickinson and Robbins, 2008). Responsible authorities and park managers need to balance tourism and economic development with the conservation of the natural and cultural heritage for which the places are highly valued. Various EU directives have put emphasis on a careful and well-considered management of these 'living landscapes' and on sufficient quantitative and qualitative knowledge about the recreational activities in the area and their reciprocal relationships with nature values (Jaarsma et al. 2011). Visitor monitoring plays an important role within the wide range of data needed for the related planning tasks. It generally consists of three components: visitor counting, visitor profiling, and analysing visitor opinions (Cope et al. 1999 and 2000; MacGregor, 1998). In particular information on visitor numbers is essential, because this baseline information is providing fundamental data for visitor management (Arnberger et al. 2002). Collection of data about visitor numbers in an area, however, is not an easy task and „few examples of structured visitor monitoring frameworks to integrate count data and apply the information to management" (Arnberger et al. 2002: 15) are available. In this paper we present our experiences with visitor monitoring in different places in the Netherlands. It elaborates on different research methods and techniques and the ways in which visitor monitoring can contribute to planning and decision-making.

Methods and techniques

We first discuss the five „w-questions" that are important to answer before a monitoring program is started: why, what, who, where, and when to monitor. Next we describe the most relevant techniques that can be used for datacollection. We focus on long term observations of car and bicycle flows. We do not aim at a complete description of all monitoring approaches and techniques. We selected a combination of methods and techniques mentioned in the literature (see, for example, Arnberger et al. 2002) with a proven reliability and preciseness in practice for long term observations.

Why: Visitor monitoring provides information about the recreational use that can be used for the planning and management of the areas and to make well-grounded decisions about for example the location and amount of services and infrastructure. The information can also be used to reduce and minimise conflicts between different user groups, balancing nature values and recreational use, for solving parking problems or checking the visitor's opinions on specific issues and possible measures.

What: What should be monitored depends on the reasons behind the visitor monitoring. For visitor counting the number of visits and their distribution in time (hourly, weekly, month) and place (in situations with more entrances) will be the unit of measurement. For practical reasons vehicles may be monitored with devices developed for road traffic counting, followed by a re-calculation with a representative set of vehicle occupancy data. A focus on vehicle data is also relevant for questions related to parking. In addition information about the activities of the visitors, their wishes and demands and their social characteristics could be useful for the management.

Who: All visitors to the area should be included in the monitoring, regardless their mode of travel. Persons working in the area, such as park employees and forest workers should not be considered as visitors. This distinction is relevant in areas where visitor numbers are low in relation to the number of cars or people going through the area for management purposes.

Where: For a baseline monitoring, entrance points to the area are the obvious counting locations. Generally these will be found on public roads at the edge of the area. However, when the road is also used for through traffic, a location beside the through road, inside the area and for example on the entrance to parking sites, may be preferable. Data for visitor profiling and getting their opinions can be gathered inside the area, for example on parking sites, as well as outside the area, at the visitor's home.

When: For the understanding of the dynamics of recreational uses it is essential to have data covering 24h a day and all seasons. Preferably the daily data should be divided into hourly volumes, allowing for an analysis of daily peak loads. Long-term monitoring enables the distinction between short term variation in visitor flows and long term trends, and the distinction between changes due to weather conditions or holidays, and those caused by management actions such as the temporary closure of a parking lot.

How: Long term observations can hardly be done without the help of mechanic counting, with some manual visual counts for calibration. Visitor counting strictly means counting of people. However, counting of people with equipment from the safety industry is much less accurate than counting of vehicles as usual in the road management. Beunen et al. (2004) show how daily numbers of cars and bicycles can be re-calculated to the desired daily numbers of visits by car, bicycle and pedestrians. They therefore use a dataset with representative values of vehicle occupancy and coefficients to correct for eventually inaccuracies in the mechanical counts. These values have been gathered during in total 33 daily manual visual counts in 1992-1996 on weekdays, Saturdays and Sundays in the four seasons (Beunen et al. 2004). This method can be applied to counting locations with a paved surface. Adequate equipment uses pneumatic tubes across the road, detects cars and bicycles separately and is battery-powered. With regular local inspections by park employees and a quarterly control by a specialist the number of interruptions of this equipment can be as low as 5.6% of all observation days during a period of 10 years (Beunen et al. 2004). For visitor profiling and visitor opinions visitor surveys can be used. Visitor surveys can be held among visitors to a specific area or by sending questionnaires to random selected addresses within a certain region. The latter has the advantage that it also allows to get the opinion of non-visitors of the area.

Results - two examples of visitor monitoring projects

Example 1: Veluwe

The Veluwe is a large region in the Netherlands that is renowned for its natural beauty with forests and moorlands. Annually it attracts about 30 million tourists. The tourism policy of the responsible authorities aims to protect the landscape values, while enhancing and improving the tourism facilities. This policy includes the realisation of a network of gateways, places where visitor facilities are combined, and from where visitors can explore the area. A visitor monitoring program was set up to collect data about the number of visitors and cars to the area, the behaviour of visitors and to evaluate the effects of the measures that were implemented. This visitor monitoring included traffic and visitor counts at 4 different areas, and a visitor survey at 12 different locations. In total 3410 surveys were filled in by visitors.

The traffic-counting programme showed that the number of cars is only problematic on a few peak days. Based upon this information the search for suitable measures could be focussed on

these peak days. Additional visitor surveys showed that most visitors on these days were largely people who liked to combine a short walk with a visit to a restaurant. The behaviour of these visitors is fairly easy to influence by gathering facilities at particular places and directing them to these places via information and road signs. This information was successfully used to develop the gateway locations (Beunen et al. 2008).

Example 2: Dune areas
In different Dune areas visitor monitoring was used to assess the effects of specific measures (Beunen et al. 2006). The visitor counts, that have started in 1992 made it possible to distinguish changes due to measures from normal fluctuations and trends. The evaluation showed that the number and location of parking places can be used to manage the number of cars and their spatial distribution in the area and that the implementation of parking charges only brings about a temporary effect on visitor numbers.
For a specific road section of a bicycle path in the Meijendel Dune area a discussion arose on the necessity of a reduction of the existing pavement width. Traffic counts from the monitoring programme showed that according Dutch capacity figures for bicycle paths the proposed reduction would decrease the capacity of the path below the required level for the actual bicycle flows. Consequently, the management decided not to reduce the existing width.

Discussion - the use of information
Our experiences with the monitoring projects in different areas showed that detailed information about the recreational use of a certain area can be useful in different ways. Over the years we have learned that information is needed about the number of cars and visitors, their fluctuation over time, and the wishes, needs and behaviour of visitors. In this section we will discuss the way in which this information proved to be useful in the planning and management of the specific areas.
First of all information is required to analyse and assess problems and to design policies and measures. The information collected with traffic counts and the visitor survey proved very valuable for finding tailor-made solutions. Monitoring programs showed that daily number of visitors fluctuates greatly. Some 70-80% of these fluctuations can be explained by differences between the days of the week, by holiday periods, and by weather conditions (Jaarsma, 1990; Thomas et al. 2012). The consequence of these fluctuations is the necessity to monitor numbers of visits for a longer period of time. Only then it is possible to understand the dynamics of recreational use and to distinguish “normal” fluctuations from trends and the effects of management measures.
We also learned that visitor management is not just a technical problem that can be solved with information about traffic flows and visitors’ needs, it also has a strongly related political dimension. There is a growing awareness that issues of nature and landscape conservation, tourism, traffic management and social and economic liveability are interrelated. Recreational traffic has negative impact on natural values, but might also disturb other visitors and local inhabitants. While it might be necessary to reduce or relocate car traffic within natural areas, it is equally important to maintain accessibility and to attract visitors to local restaurants and other businesses. This implies that not only the manager of the site but also local and regional authorities, inhabitants, and entrepreneurs get involved in the planning and decision making processes. All these actors have different interests and different ideas about the development of the area.
In our projects we have witnessed that information about the number of visitors and cars plays an important role in social and political debates amongst the involved stakeholders. Because of actors’ different views upon the issue at hand, the information about the number of visitors can be highly contested. This hampers the decision-making about problems, effects, and possible interventions. We have seen that if actors do not agree with the problem definition or the available information, they are unlikely to agree on the suggested measures. In the Veluwe project for example, the discussion among the actors involved about the number of cars in the area, about their possible negative effects and about the necessity to take action, made it very hard to implement measures. Only after reliable information about the number of cars was collected, the plans could be pursued (Regnerus et al. 2007).
Reliable information about the number of visitors is also important to assess the economic contribution of the recreation and tourism business. Quantitative information for example is useful to show responsible politicians the economic benefits of tourism and recreation and therewith for convincing them about the need to invest in conservation and management.

Conclusion

The experiences with visitor monitoring projects show that each area requires a tailor-made approach. The approach depends on the information needs, the resources available and the characteristics of the area and its use. Various projects have shown that a combination of automatic vehicles counts with visual counts and surveys is an efficient, effective and relatively inexpensive way to collect baseline information. Our studies have shown how this data can be collected in a reliable way and how it was successfully used for the management of the area.

We have witnessed that more and more attention is given to the supra local or regional scale, where tourism is seen as motor for economic development and preservation of nature and landscape qualities. Collecting information about visitor flows on a regional level is difficult however, because there might be many places where people can enter the area and recreation traffic might intermingle with other traffic flows.

An interesting topic for further research is the relation between visitor management and place branding (Van Assche and Lo, 2011). Regional and national parks compete for attention in order to attract visitors and investments. Place branding is seen as a powerful way to develop and strengthen the local or regional identity of a place with the promise of value and worthwhile experiences. Place branding is not just about communicating, but also about stimulating and executing creative and innovative 'on-brand' ideas; that is, actual investment in local products, tourism services, infrastructure, education, sports, health care and cultural history (Govers and Go, 2009, p 15). Both visitors and residents participate actively in this process of place branding. Within the literature about place branding increasingly attention is given to planning and governance. The ways in which visitors are 'welcomed' in an area, the places that they are directed to, the stories that they are told through signs, information panels and visitor centres all contribute to the identity of the area and thus to the brand.

Place branding is considered a useful means of achieving policy integration on a regional level. Applying successful branding strategies require mapping, planning and protecting of assets and integration policies in a political context that is experienced as legitimate and inclusive. As we have shown visitor monitoring can be a useful means to collect data and create a shared understanding of the issues at hand, therewith form the basis for joint action and the integration of different policies.

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RECREATION AND NATURE CONSERVATION AS PART OF THE QUALITY OF LIFE CONCEPT

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Abstract
The paper describes the concept of quality of life as one of the key concepts of contemporary social and economic development. Its aim is to analyze recreation and nature conservation as vital parts of quality of life, which may take a form of indicators or a domain. Various methodological aspects of the position of recreation and nature conservation are discussed, especially in relation to the increasing number of facilities and services as prerequisites for an improvement of the quality of life, or by contrast, as the satisfaction of an individual is emphasized. Research into recreation and conservation aspects of the quality of life is at its beginning.

Key words: recreation, nature conservation, quality of life, indicators

Introduction

Quality of life is one of the concepts aiming at describing current social and economic reality. Its advantage is simplicity and comprehensibility for the public because almost each individual has an idea of what the quality of life is (Fayers and Machin 2007)[36]. For this reason, the concept is often used by the political and control sector.
Although the origins of good and quality life explorations can be found in Aristotle´s Nicomachean Ethics (Fayers and Machin 2007), in modern times, interest in the quality of life became evident in the 1960s, when the Western society got rich but did not become more satisfied. Recognition that the quality of life is not a function of material wealth has become its *raison d'être* (Murgaš 2012). Apart from the number of publications and articles and their citation responses, the frequency of terms on the Internet shows evidence of an explosion of interest in the study of the quality of life as well. By the end of June 2008, it was possible to find 35.5 million links on the Internet corresponding with the term "*quality of life*" and approximately 72 thousands of links corresponding with the term "*kvalita života*". In February 2013 it was 1,460 million links on *"quality of life"* and 5.250 million links on *"kvalita života."* However, quality of life is a concept that is extremely complicated, complex and interdisciplinary (Heřmanová 2012). Recreation is considered to be one of the parts of the quality of life (Russel 1990, Baker and Palmer 2006). Research into relations between recreation and quality of life has its origins in the 1980s (Weiskopf 1982). The aim of the paper is to analyze recreation and nature conservation as elements of quality life, which may have the form of indicators or domains.

Quality of life concept

What is quality of life? What are we discussing when talking about it? In its local discourse and academic sphere there is a wide variety of terms used such as happiness, way of life, personal well-being, welfare, living standards, quality of place, lifestyle, which are used as synonyms (Ira and Huba 2007).
Potůček (2002, p. 3) understands the quality of life *"as a broad concept describing people´s objective life situation and their subjective perception of this situation at the same time. It is a multidimensional category covering all the essential characteristics of an individual human life related to the overall level of individuals´ personal well-being living in the society. Thus the quality of life is related to the whole of individuals in a given society. .[...] The quality and sustainability of life are considered by some authors (Beck, Giddens, Lash) as definition criteria [...] of transformations from industrial-oriented transformation to post-industrial modernization. Therefore, we also consider the quality and sustainability of life a sort of target functions of the society development."* Murgaš (2012, p. 26) in his definition of quality of life follows Pacione´s (2003) dichotomy of well-being and ill-being: *"The quality of life of an individual is composed of psychological, somatic, religious, social and economic well-beings leading to a subjective feeling of satisfaction or happiness – confronted with health, socio-pathological,*

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Quality of Life Research Unit University of Toronto understands quality of life as an answer to a simple question: How are you?

economic and environmental evils, and this confrontation takes place in spatially differentiated external environment."

People´s interest in improving their lives and their higher quality has been known since antiquity; Aristotle´s *Nicomachean Ethics* is considered the first work dealing with this issue (Fayers and Machin 2007), in which the antique genius develops the principle of *eudaemonia*, top well-being that a person can achieve by their good life, and its counterpart in the form of *hedonism*. In modern history, the concept of quality of life appeared in the 1960s, when the Western society got rich, however, people´s satisfaction with their lives has not increased. People started to understand that *the quantity of life* in terms of material goods does not bring *the quality of life* in terms of experiencing good life that brings joy. Pacione (2033, p. 19) calls knowledge that the quality of life is not a simple function of material wealth, "the welfare paradox". In economics, the relation between increasing material welfare and not increasing (in some case even decreasing) subjective happiness is known as "the Easterlin Paradox" (Murgaš 2012).

Quality of life apparently as well as all the new concepts does not have a formed methodology. It is connected with the fact that the development of methodology lags behind the development of life quality measurement tools. In addition, it is a concept extremely complicated, multidimensional, complex and interdisciplinary (Heřmanová 2012). One of the facts there is a general consensus about is that quality of life is composed of two dimensions: *personal*, or subjective, psychological and *spatial*, or objective. The personal dimension expresses subjective, emotional and cognitive going through an individual´s life, which is usually evaluated by the particular person. It is consequently the answer to a trivial question: How are you? From experience that the evaluation is subjective, its variability in time and space results, and changes can occur within a short time. The spatial dimension expresses evaluation in what exterior, spatially differentiated conditions a person lives. It can be stated that the objective dimension is related to space, which may have different hierarchical levels, as from a settlement or town to a state or a group of states. External conditions are characterized by stability, they change generally in the form of changes in trends. *The spatial dimension of quality of life* is the term used for this dimension. The personal dimension is considered to be more significant of the two dimensions, and it is also important to underline that the complexity of the quality of life demands using both of the dimensions. If one of the dimensions is absent, it is not the quality of life but only a dimension, domain or quality of life indicator.

Both personal and spatial dimensions of the quality of life, i. e. their experiencing and evaluation, are significantly modified by culture and values. Individuals evaluate their lives and living conditions with strong dependence on how objectives of the society are set generally, within this even something like the meaning of life, when these aims are naturally internalized by individuals within the frame of socialization, which is true for both the macro-regional and the local community level (Heřmanová 2012).

In relation to the quality of life, terms such as *increase in quality of life* or *growth of quality of life* are used especially in the political and control sectors. These terms are not logical; they deny the very essence of quality of life. The quality of life cannot be increased just like that it is not possible to increase e.g. the number of teeth. It does make sense to take care of good teeth, but not to increase their number. The quality of life can be improved or deteriorated by improving or deteriorating its indicators, as such it is not possible to increase or decrease it, and it cannot grow either. Increases in values of "positive indicators", i. e. indicators that have a positive wish to increase their numeric values, e. g. education, are beneficial but it does not mean an automatic positive correlation between education and the quality of life. Likewise, reducing values of "negative" indicators where it is desirable to reduce their numeric values, e. g. crime rate, is beneficial but it does not mean that in the country, where the crime rate is lower in comparison with the city, there is automatically a positive correlation between low crime rate and the quality of life. The reason why this is so is the fact that quality of life is not a mechanical sum of its indicators, but it is a multidimensional and complicated complex of indicators with internal causation. The use of terms growth or increase means identifying the quality of life with prosperity, or with other economic indicators such as average salary, gross domestic product, etc. The expression "growth of quality of life" is a negation of its meaning (Murgaš 2012).

Recreation and nature conservation as a part of the quality of life concept

Recreation and nature conservation are considered a part of the quality of life (Russel 1990, Baker and Palmer 2006). Research relating to recreation and quality of life has its origins in the 1980s (Weiskopf 1982). In connection with the development of recreation in the context of quality of life, the question of the number of facilities and quality of services is discussed or by contrast individual´s satisfaction as a prerequisite for improvement of the quality of life is emphasized. Not only examples of coast parts embedded in concrete e. g. in Spain illustrate the eligibility of requirements to take into account the interests of nature conservation in the course of solving the dilemma.

Recreation and nature conservation are manifested in the quality of life both in its personal (subjective, psychological) and spatial (objective) dimensions (Keys et al. 2012). The Swedish Government Office (online 2004) states: *"The policy of nature conservation is about quality of life and bringing nature conservation close to people."* Besides the terms recreation and nature conservation in the context of quality of life, we also use the terms leisure time, environment, ecology, sustainable life, quality and sustainability of life, the environment, quality of environment.

Participation in recreation and nature conservation or related concepts in the quality of life can have the form of individual indicators creating the Index of Quality of Life or domains, i. e. groups of indicators at all hierarchical levels, from the global macro-level evaluating the quality of life in individual countries (Mederly et al. 2004, Marks et al. 2009), the meso-level of spatial state units (Mederly et al. 2004. Murgaš 2012), to the micro-level of settlements or their parts (Lall and Lundberg 2006, Ira and Šuška 2006, Ira and Andráško 2007, Heřmanová 2012). Glatzer (2012 p. 383) divides the quality of life, understood as social well-being, into *objective living conditions* with seven domains including environmental conditions and *subjectively accepted personal well-being* (positive or negative) with nine domains, leisure time and environment included. Indicators of leisure time activities, way of spending holidays, the state of the environment and others can be found in studies devoted to the quality of life or related concepts of various countries (Phillips 2003, Boelhouwer and Roes 2004, Cummins et al. 2007).

Discussion

The methodological intersection of the concept of quality of life on the one hand and recreation and nature conservation on the other hand can be represented by the quality of place (Florida 2012). From the perspective of recreation and nature conservation, a place with its quality is the space of life, society and community. Community features and pride can be its strong quality of life predictors (Baker and Palmer 2006). "*Quality of life is a reflection of community values*" (Phillips and Budruk 2011, p. 4). From the perspective of quality of life, the quality of a place refers to the lowest hierarchical level of spatial dimension, which is residential quality of life. Place quality research can bring benefits to quality life research by anchoring the phenomenon of place in both personal and spatial dimensions.

Recreation and nature conservation are examined in relation to quality of life from the point of view of the people who live in the researched area, and not the visitors of the area. What remains unresolved is anchoring of these phenomena as positive or negative indicators, or indicators as they can be both. An analysis of 352 of surveys conducted in the USA has found that a number of indicators including participation in recreation and length of stay in a community negatively correlate with quality of life (Baker and Palmer 2006).

Conclusion

The aim of this paper was to discuss recreation and nature protection as elements of quality of life. Quality of life is an extremely complicated, multidimensional, complex and interdisciplinary concept (Heřmanová 2012). It does not have a formed methodology or terminology, which is the result of the methodology development lagging behind the development of measurement tools. There is a general consensus saying that quality of life is composed of two dimensions: *personal*, or subjective, psychological and *spatial*, or objective. Recreation as well as nature conservation are considered parts of quality of life (Russel 1990, Baker and Palmer 2006). In connection with the development of recreation in the context of quality of life, the question of the number of facilities and quality of services is discussed or by contrast individual´s satisfaction as a prerequisite for improvement of the quality of life is emphasized. The methodological intersection of the concept of quality of life and recreation and nature conservation can be represented by the quality of place (Florida 2012). From the perspective of

recreation and nature conservation, a place with its quality is the space of life, society and community. From the perspective of the quality of life, the quality of place refers to the lowest hierarchical level of spatial dimension, which is the residential quality of life. Place quality research can bring benefits to quality life research by anchoring the phenomenon of place in both personal and spatial dimensions. Axiological anchoring of recreation and nature conservation as positive or negative indicators, or purely indicators, has not been solved yet.

Summary
The aim of this paper was to discuss about recreation and nature conservation as elements of the quality of life concept. The main characteristics of the quality of life concept are the enormous complicacy, complexity and interdisciplinary character (Heřmanová 2012). It can be generally stated that quality of life is experiencing of life in objective, spatially differentiated conditions. Quality of life does not have a formed methodology like other contemporary concepts and it does not have any conceptual apparatus either. The few generally accepted fact concerning quality of life are e.g. its complexity and division into two dimensions: personal (subjective, psychological) and spatial (objective). The quality of life came into awareness in the 1960s, when the Western society became rich, however, people´s satisfaction did not increase. Quality of life is not associated with material well-being. It cannot be measured. What can be measured are its indicators. It cannot grow; it is possible to make it better or worse.
Recreation and nature conservation are considered parts of quality of life (Russel 1990, Baker and Palmer 2006). In connection with their development, the question of the number of recreation facilities and quality of services is discussed or by contrast individual´s satisfaction as a prerequisite for an improvement of the quality of life is emphasized. Recreation and nature conservation are demonstrated in quality of life in its personal (subjective, psychological) and spatial (objective) dimensions (Keyes et al. 2012). The methodological intersection of the concept of quality of life and recreation and nature conservation can be represented by the quality of place (Florida 2012). From the perspective of recreation and nature conservation, a place with its quality is the space of life, society and community. From the perspective of the quality of life, the quality of place refers to the lowest hierarchical level of spatial dimension, which is the residential quality of life. Place quality research can bring benefits to quality life research by anchoring the phenomenon of place in both personal and spatial dimensions. Axiological anchoring of recreation and nature conservation as positive or negative indicators, or just indicators, has not been solved yet. An analysis 352 of conducted surveys in the USA has found that a number of indicators including participation in recreation and length of stay in a community negatively correlate with quality of life (Baker and Palmer 2006).

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RELIEF ASSESSMENT METHODOLOGY WITH RESPECT TO GEOHERITAGE BASED ON EXAMPLE OF THE DEBLÍNSKÁ VRCHOVINA HIGHLAND

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Abstract
The article deals with history, presence and possible future development of geoconservation in the Czech Republic. Both examples of legislative instruments and other geoconservation activities are presented. Practically, the geoconservation activities are shown at the case study of the central part of the Deblínská vrchovina Highland (Maršov valley area) in the south-eastern part of the Czech Republic.

Key words: Geoconservation, geoheritage, geomorphosites assessment, Maršov valley, Czech Republic

1 Introduction

The Earth Sciences play a very important role today in the present day society: they help to discover and understand the wide spectrum of abiotic features of landscape including its components, processes, relations and history and the so called geodiversity. Geodiversity can be defined as "the natural range (diversity) of geological (rocks, minerals, fossils), geomorphological (land form, processes) and soil features, including their assemblages, relationships, properties, interpretations and systems" (Australian Geoconservation Commission, 2002, Gray 2004), and it is a fundamental part of the natural environment (Migon 2010).

Many geodiversity sites are used for outdoor education; geodiversity sites are often of great recreational and tourism value, inspiring people to enjoy or learn about nature. Geodiversity has a crucial role in maintaining a range of environmental services.

Evaluation and maintaining an inventory of geodiversity can serve as a tool for geoconservation and management of geoheritage and geodiversity. The principles of geoconservation were defined in Australian Natural Heritage Charter (Australian Geoconservation Commission 2002). In general, we can define the geoconservation as an activity of humans that is oriented to the conservation of geoheritage. We consider geoheritage as a term which includes geologic, geomorphologic and pedological elements, forms and processes worth of protection (Sharples 2002). Conservation of geoheritage or geoconservation includes both management and strategies for rational use of this heritage.

Currently, in the Czech Republic, the protection of nature, or natural heritage, has been widely accepted, but the protection of wildlife still has more attention than geoconservation. However, the biodiversity, microclimate and mesoclimate are conditioned by the geological, geomorphologic and other abiotic components and these components often have influence on the human perception and land use. Besides, the geoconservation plays an important role in the knowledge and understanding of the importance of the geological and geomorphological heritage.

The main legislative tool governing the protection of nature is Law 114/1992 Coll. The law defines six levels of natural protection (national park, protected landscape area, national natural reservation, national natural monument, natural reservation and natural monument). In spite of the progressivity of the law, the geoconservation is still included in the general protection of nature and it is not defined exactly.

Another activity that includes geoconservation is establishing the national geoparks. The Ministry of Environment in cooperation with the European Geoparks Network released Ministry Directive No. 6/2007 on the uniform procedure for the nomination of the national geological park or National Geopark. The main objectives of declaration of national geological parks is to promote the sustainable development of the region, to contribute to geosciences research, awake the interest of locals and tourists public in geosciences and raise the knowledge of the geologic and geomorphologic heritage of the area. There are 4 geoparks now: Czech Paradise, Czech-Bavarian geopark, GeoLoci and Železné hory (1).

A remarkable project is the Database of geosites that is kept and updated by the Czech Geological Survey. More than 2,500 sites are associated in this database (2). Information such as general information (location), the geological characteristics, reasons of protection, conflicts of interests, degree of protection and photo documentation are given for each site. The database is open and anyone can propose a new geosite or actualize information (via consultation with a specialist). A similar database (Database of speleologic objects) is run by the Czech agency for natural conservation and it is focused on the karst phenomena (3).
Although the geoconservation legislation is not very developed in the Czech Republic, the scientists and public have already noted the importance of geoheritage and its protection. Sites like geoparks seem to become more and more attractive and a number of small geological gardens, thematic geopaths or information panels in the landscape are beginning to appear.

2 Managing the geoheritage and assessment methodology

For geoconservation purposes, we need to identify and evaluate the sites of geological and geomorphological interest; this evaluation or assessment can serve the purposes of the management of the geoheritage. The concept of "geosites" and "geomorphosites" is suitable for this purpose. Geosites or geomorphosites can be defined as landforms that have acquired a scientific, cultural, historical, aesthetic and/or economic value due to human perception; they can be single geomorphologic objects or wider landscapes. These can be modified, damaged, and even destroyed by the impacts of human activities (Reynard, Coratza, Regolini-Bissig eds. 2009). The term "geomorphosites" was introduced by Panizza (2001).
As mentioned above, the geomorphosites can acquire various values. Reynard, Coratza, Regolini-Bissig eds. 2009) divided these values in two groups: 1) scientific values that present an importance for understanding a form, process or evolution. Within the geomorphologic sites, the processes are considered one of the most important scientific values together with representativeness of the form and process, uniqueness and palaeogeographical significance of the site, 2) additional values include cultural, aesthetic, economic/social and ecological values. Cultural value is represented by the archaeological or historic significance of the site and can both be influenced by geomorphology of the site and can have an influence on the site. The perception of the aesthetic value is based on the colour contrast, structure of the space or heterogeneity of the site. From It is the most problematic to catch and describe the values of the site from these facts. Economic or social value is related to the potential use of the site especially for so called geotourism. Ecological value of the site expresses the relation between geomorphologic elements of the site and biota and as well as cultural value can both be influenced by geomorphology of the site and can have an influence on the site.
The assessment methodology is constituted of various steps: 1) identification of the significant geosites, 2) inventory of these sites, 3) assessment of the scientific and additional values, 4) SWOT analysis, 5) synthesis.
The identification of the important or significant geological and geomorphological sites is done on the base of the field works, analysis of the maps, photos and existing literature.
Inventory includes various groups of information : 1) general data about the site (name, position, property), 2) geology (lithology, petrography, tectonics, sedimentology, pedology) and geomorphology (genesis of the geoform, its age, mezoforms and microforms, palaeogeographic importance, dimensions of the geoform, dynamics of the site, actual processes), 3) ecology (biota, ecologic relations between biotic and abiotic components, presence or absence of protected species), 4) socio-economic aspects (accessibility, infrastructure, promotion of the site, geotouristic and geodidactic use), 5) cultural aspect (presence of archaeological and historical components, symbolic or religious importance of the site), 6) maps, photos, schemes.
The proposed numerical assessment (see Tab. 1) of geosites and geomorphosites is based on already existing methods (Reynard et al., 2007, Pereira et al., 2007). The numerical assessment has an advantage of relative objectivity, but even so, there are certain parameters that can be measured with difficulties and could be the source of disagreements. Another problem of the assessment process is subjectivity, especially in the evaluation of aesthetic and cultural aspects of the site, but also in evaluation of the scientific significance of the site.
Based on inventory and assessment of scientific and added values, the SWOT analysis is done. It concludes or summarizes the strong and weak parameters of the site, analyses the risks and threats and refers to the opportunities of the site (for example geo(morpho)site as an economic resource – for geotourism, as an educational resource etc.). The further synthesis can serve as the base for the management measures for the sites, for better legal protection of the site or it can show the ability of the site to be used for geodidactic purposes.

Tab. 1: The proposed methodology for evaluation of geoheritage

1. Scientific value		
number	criteria	score
1.a	Representativeness	0-1
1.b	Integrity	0-1
1.c	Exemplarity, pedagogical use	0-1
1.d	Number of similar sites in the area of interest	0-1
1.e	Mezoforms, microforms	0-1
1.f	Presence of geological and pedological features	0-1
1.g	Knowledge of the site, scientific articles	0-1
1.h	Importance for understanding to geological evolution	0-1
1.i	Paleogeographic importance (reconstruction of landscape, climate etc.)	0-1
1.j	Existing protection of the geo(morpho)logic features	0-1
Scientific value total score		max. 10
2. Additional values		
2.a	Aesthetic value	
	The number of colours	0-0,5
	Structure of the space	0-0,5
	Global aesthetic value	0-1
2.b	Ecologic value	
	The influence of the geomorphologic feature on the ecologic feature	0-1
	Presence of the protected species	0-0,5
	Existing protection of the ecologic features	0-0,5
2.c	Cultural value	
	Historical and archaeological importance	0-1
	Religious and symbolical importance	0-1
	Literal and artistic importance	0-1
2.d	Knowledge of the site due to its additional values	0-1
Additional values total score		max. 8
3. Potential for the use		
3.a	Visibility	0-1
3.b	Accessibility	0-1
3.c	Infrastructure (tourist facilities)	0-1
3.d	Attendance, number of visitors	0-1
3.e	Current use of the geo(morpho)logic features of the site	0-1
3.f	Current use of the additional values of the site	0-1
3.g	Total number of the possibility of the uses	0-1
3.h	Limits of the use	0-1
3.i	Existing promotion of the site	0-1
Potential for use total score		max. 8
4. Threats and vulnerability		
4.a	Existing and current threats	0-1,5
4.b	Potential threats (in the case of the more intensive use of the site)	0-1,5
4.c	Existence of the legal protection	0-1
Threats and vulnerability total score		max. 4
TOTAL SCORE		MAX. 30

3 Study area

Deblínská vrchovina Highland lies about 25 km NW from Brno (SE part of Czech Republic). The area has a very varied geological structure thanks to its position on the eastern margin of the Bohemian Massif, which has a significant influence on the formation of relief. Study area presents the harmonic landscape characterised by mosaic of fields, forests, meadows and ancient orchards. The most important landforms of the area are deep incised valleys, karst forms, various rock formations of cryogenic origin and old abandoned quarries. The area of Deblínská vrchovina Highland is approximately 77 km^2, with altitudes varying between 543 and 230 m. Thanks to its proximity of Moravian metropolis Brno (approximately 380 000 habitants) it can offer a potential for recreation and tourism activities.
The closer area of interest is situated within Deblínská vrchovina Highland and it includes the area around Maršov valley.

3.1 Geology

The parautochthonous basis of the geological structure is represented by Svratka massif, which consists of Prepalaeozoic intrusive and metamorphic rocks and Palaeozoic basal clastics and limestone of Devonian age and siliciclastics sediments of Carboniferous age.
Alochton Moravicum nappe is made up of a weak metamorphosed volcano-sedimentary complex with prevailing phyllites, orthogneiss (metamorphosed Cadomian granite). The entire structure, which includes both Svratka massif and Moravicum nappe is called Svratka dome (Mísař et al. 1983).
Tertiary is represented by Miocene and Pliocene freshwater sediments which fill older valleys and depressions between the sites Maršov and Lažánky. Here, the lower Miocene sediments with abundant fauna are overburden with clays with sand and gravel positions (Hanžl et al. 2007).
Pleistocene is represented by fluvial sandy gravel, which often forms terraces at different heights above the present valley bottom. Loess and loess eolian sediments are common in the wider area and reaches thicknesses of up to 5 m. Deluvial sediments occur in rugged terrain covering bottom depression relief and foot slopes along streams. Holocene sediments cover the upper part of the plains. The material consists of sand and clay, sometimes with fragments of rocks. Flood earths are not very thick (max. 2 m). The Holocene also includes anthropogenic sediments (heap, dumps of the quarries) (Hanžl et al. 2007).
The geological development of the area reflects an evolution of the eastern margin of the Bohemian Massif during Cadomian, Variscan and Alpine orogeny. The oldest rocks are represented by remnants of Cadomian metamorphosed volcaniclastic complex - Moravicum (gneiss, erlan, metabasites) and intrusive rocks of Svratka Massif. During Palaeozoic, the area was flooded and the sedimentation complex formed (siliciclastics, limestone). During the Variscan orogenesis, the Moravicum was pushed onto Svratka Massif. These tectonic processes were accompanied by the formation of mylonites, metagranits and orthogneisses.
During the Mesozoic and Paleogene, the area was probably affected by intensive peneplenization. Following Alpine orogeny brought the transgression (Miocene) and tectonic movements (Pliocene), which was accompanied by changes in gradient conditions. During the Pliocene and Quaternary, the main watercourses started using major tectonic lines and formed relatively deep valleys. In the Quaternary, today's river network was formed and the loess was blown. Present important processes are represented by denudation and accumulation of sediments in the floodplains (Hanžl et al. 2007).

3.2 Geomorphological overview and selected geosites/geomorphosites

In the present, the relief is influenced especially by exogenous natural agents and human activities, and the most significant landforms are polygenetic rock formations (they were modelled by slope and cryogenic processes), fluvial forms, karst forms and anthropogenic forms. Then, based on terrain research, representative sites (Fig. 1) were selected from each group.

3.2.1 Polygenetic rock forms

Various polygenetic rock formations in the area were modelled by many geomorphological processes such as slope processes, cryogenic processes or karstification. The origin of these rocks outcrops is often linked with the lithology: the resistant rocks (limestone, basal clastics, gneiss) formed significant outcrops and elevations.

The significant outcrops of the basal clastics are situated in the southern part of the area at the site called **Skalky (site n. 1)**, the genesis of this form is influenced especially by the resistance of the rock. The most important limestone formations are situated in the central part of the study area in Maršov valley and on the southwest slope of **Dřínová hill (site n. 8)**, where the contact of two different types of limestone can be seen.

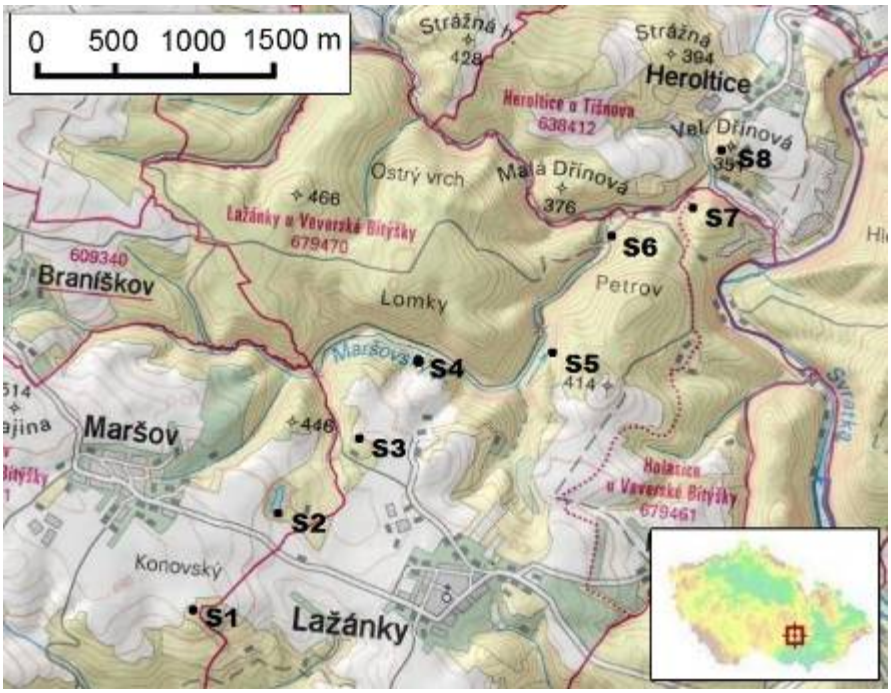

Fig. 1: Map of study area and selected sites: S1 – Skalky, S2 – Flooded kaolin quarry, S3 – Old limestone quarry, S4 – Karst spring and Badger's cave, S5 – Maršov adit, S6 – Floodplain of Maršov stream, S7 – Narrow cave, S8 – Dřínová hill outcrop (source: geoportal.gov.cz)

3.2.2 Fluvial forms

The most important fluvial form of the area is in Maršov valley. It is 4 km long; in the first section it moves from south to north, the central part of the valley has a direction east - west and the last segment has the direction south – north again. Maršov valley also forms floodplains of up to 100 m wide with typical fluvial landforms, such as meanders, oxbow lakes, cutoffs, alluvial ramparts **(site n. 6 – Floodplain of Maršov stream)**. Within the channel, the gravel beds and riparian slips are formed. These forms are developed in the north-eastern area of the study area where the Maršov stream flows into the Pejškov stream.

The area is rich in the relatively deep gullies with bedrock exposed at the bottom, which could be the result of recent precipitation events. The gullies are often tied to the river network and they contain water only during times of heavy rain. However, in some places the gullies are formed without any significant relation to any watercourse. Gully formation is mostly conditioned by relief (relatively steep valley slopes) and lithological conditions (unconsolidated sediments, polygenetic soil).

3.2.3 Karst forms

The limestone part of the study area is known as Heroltice-Lažánky Karst. Among the most important karst phenomena are the Karst springs near Badger's cave, Narrow cave, spring and ponor in the riverbed of the Pejškov stream and also Kašparec and Bagrista's cave, which no longer exists because of limestone quarrying.

The **Karst spring near Budger's cave (site n. 4)** is connected with ponor approximately 500 m south-east. The ponor depression has the shape of a small half-blind valley, the Karst spring looks like a fracture gap and speleologists discovered the passage to be 14 m long in dry periods, before they got to the water pool. It is obvious that the Karst spring performs its function only at higher water levels; the normal spring of the stream is likely to be below one of the marsh of the Maršov stream (Mejzlík 1970). The Karst spring is probably connected with the Badger's cave and cave system in the limestone quarry area.

Badger's cave is located about 100 m east of the Karst spring, its entrance has dimensions of approximately 1 x 1 m followed by a 15 m long corridor, with probable connection to the cave system in limestone quarry. This system was discovered in the active limestone quarry north of Lažánky during the 80's. Before its destruction, the rescue exploration was carried out and Kašparec and Bagrista's caves were described in detail (Himmel 1989). These caves of total length of over 200 m were probably a fragment of a larger cave system.
South of Heroltice, about 1 km from the mouth of the Pejškov creek to Svratka, the ponor is located. It is hidden beneath the stream gravels. Water in the creek declines slowly and and what finally remains is a dry riverbed, which is traversed by water only at higher water levels. A spring is located about 500 m down-stream, but it is now partly captured for water supply (Mejzlík 1970).
The **Narrow cave (site n. 7)** is located in the hillside of Na Bílé, in the north-eastern part of the study area. The total length of the cave is considered to be about 150 m; the corridors are decorated with stalactites and calc-sinter (Hromas ed. 2009).

3.2.4 Anthropogenic forms
Given that the area has been influenced by human activities for a long time, there appears to be a considerable amount of anthropogenic shapes, which can be divided into several groups. The most significant anthropogenic forms were created by mining activities and they are represented by quarries, adits and unconsolidated sediment heaps.
Limestone has been quarried in the study area since the 18th century. Up to the 70's of the 20th century, the quarries were small and currently these quarries gradually integrate into the landscape (Veselá 2010). Small abandoned quarries are located 1 km north of the village, Lažánky, and they do not significantly affect the landscape. On the contrary, the vegetation here spontaneously covers the slopes and bottom. In some of these quarries, caves or their fragments and other karst phenomena can be seen **(site n. 3 – Old limestone quarry)**. In the 70's, a new limestone quarry was opened which currently covers an area much larger than the abandoned quarries in total. In the western part of the quarry there are fragments of caves, however, they cannot be explored due to the lack of interest of the owner of the quarry.
At the turn of the 19th and 20th century, the kaolin bearing 1 km east of Maršov village was discovered and in 1898 the systematic mining started. Gradually, the bearing was extracted and getting into greater depths, the mining proved unprofitable, leading to the closure of the kaolin mine in 1932 (Bíl 1995). Currently, the **Kaolin mine (site n. 2)** measures 270 x 130 m, it is flooded and it represents an interesting landscape feature.
About 500 m southwest of Dřínová hill, on the left slope of the Maršov valley, an old adit is located (Mátl 2001), which is now closed. Another adit **(Maršov adit, site n. 5)** is located 1 km southwest of the Dřínová hill on the right side of the Maršov valley and it is important especially from the ecological point of view as it serves as a hibernaculum of the bats.
Other anthropogenic forms are represented by agricultural forms (agricultural terrace, stone ramparts), communication forms (ramparts, banks and cuttings). Selected sites can be seen on Fig. 2.

4 Results

4.1 Numerical assessment
The numerical assessment of the geosites and geomorphosites is not the aim of this paper, but serve only as a base for other steps and for better overview of the sites in the area. The results of numerical assessment are in the Table 2, the ranking is displayed in the Table 3.

Tab. 2: The results of numerical assessment of sandstone geosites in Maršov valley area

Value/site	**s1**	**s2**	**s3**	**s4**	**s5**	**s6**	**s7**	**s8**
Scientific value	8	6.25	6.75	5.75	3.25	4.5	6.25	6.25
Additional values	2.75	4.25	4.5	1.5	2	2	1.5	0.75
Potential for the use	4.75	6	6.25	3.25	3	4.25	3.75	4.75
Threats and vulnerability	2.5	0.5	1	2.5	2.5	2	2	1.5
TOTAL SCORE	18	17	18.5	13	10.75	12.75	13.5	13.25

Tab. 3: The ranking of the geosites according to the values in Maršov valley area

ranking	Scientific value	Additional values	Potential for the use	Threats and vulnerability	TOTAL SCORE
1	s1 (8)	s3 (4.5)	s3 (6.25)	s1 (2.5)	**s3 (18.5)**
2	s3 (6.75)	s2 (4.25)	s2 (6)	s4 (2.5)	**s1 (18)**
3	s2 (6.25)	s1 (2.75)	s1 (4.75)	s5 (2.5)	**s2 (17)**
4	s7 (6.25)	s5 (2)	s8 (4.75)	s6 (2)	**s7 (13.5)**
5	s8 (6.25)	s6 (2)	s6 (4.25)	s7 (2)	**s8 (13.25)**
6	s4 (5.75)	s4 (1.5)	s7 (3.75)	s8 (1.5)	**s4 (13)**
7	s6 (4.5)	s7 (1.5)	s4 (3.25)	s3 (1)	**s6 (12.75)**
8	s5 (3.25)	s8 (0.75)	s5 (3)	s2 (0.5)	**s5 (10.75)**

The evaluation of scientific parameters was the most favourable for site n. 1 Skalky, mainly due to the high representativeness, intactness, educational value and palaeogeographical importance. Site n. 3 (Old limestone quarry) acquired relatively high scientific values through its high educational value and representativeness. On contrary, site n. 5 (Maršov adit) was rated very low, mainly due to lack of geological and geomorphological importance. Site n. 6 (Floodplain of Maršov stream), although significant in terms of meso-and microforms, but other criterias were not as significant. Sites n. 2 (Kaolin mine), 7 (Narrow cave) and 8 (Dřínová hill outcrop) are evaluated as average.

The highest additional values were acquired by the sites n. 3 and 2 (Old limestone quarry) and L2 (Kaolin mine) especially thanks to their historical importance and aesthetical value. Relatively well-evaluated was the site n. 1 (Skalky) mainly due to the overall aesthetic value. Site n. 8 (Dřínová hill outcrop) is not rich neither in cultural values nor in historical and ecological values. Other sites have reached an average score, although the ecological value of the sites n. 5 and 7 is relatively high thanks to the presence of protected animals.

The highest potential for use are the sites n. 1, 2, 3 (Skalky, Kaolin mine and Old limestone quarry) thanks to the visibility and site n. 8 (Dřínová hill outcrop) thanks to its good accessibility and proximity of infrastructure. On the contrary, site n. 4 (Karst spring and Badger's cave) and site n. 5 (Maršov adit) have low rating mainly due to the lack of promotion.

Site n. 1 (Skalky) was evaluated as the least vulnerable site mainly due to its location in the natural park of the Valley of White Creek and the absence of anthropogenic and natural threats that could disturb and damage the site. Likewise, sites n. 4 and 5 (Karst spring and Badger's cave, Maršov adit and Narrow cave) are not very vulnerable because of its relative inaccessibility and the absence of threats. Sites with better accessibility and short distances from places of tourist infrastructure are more vulnerable and they are also exposed both to anthropogenic threats (vandalism in the case of the Old limestone quarry, rubbish dump in the proximity of the Dřínová hill outcrop) and natural threats (landslides on the slopes of Kaolin mine).

Overall assessment shows the following results: the site L3 (Old limestone quarry) acquired the highest score due to its high scientific and added values and also to the considerable potential for use. Site n. 1 Skalky was also highly evaluated thanks to its considerable scientific value and potential for use. This site is also less vulnerable than others. A good score was acquired by site n. 2 (Kaolin mine; owing its high score to additional values and high potential for use. The lowest values were reached by sites n. 5 (Maršov adit) despite its ecological importance. Other sites acquired average rating, although some have really high scientific values (site n. 7 Narrow cave, site n. 8 Dřínová hill outcrop) or good potential for use and high educational value (site n. 7 Floodplain of Maršov stream).

Fig. 2: Local geoheritage sites in study area: 1 – Skalky (site n. 1), 2 – Kaolin mine (site n. 2), 3 – Old limestone quarry (site n. 3), 4 - Karst spring near Budger's cave (site n. 4), 5 - Maršov adit (site n. 5), 6 - Floodplain of Maršov stream (site n. 6), 7 - Narrow cave (site n. 7), 8 - Dřínová hill (site n. 8) (source: authors, 2011)

4.2 SWOT analysis of the geoheritage at the study area

The SWOT analysis in geomorphosites and geosites assessment presents a quick and effective tool for comparing the sites and to get an idea about its qualities. In this case, the SWOT analysis was done for every site and then summarized. The following part presents all the important strong and weak parameters of the geoscience sites as well as the opportunities and threats.

Strengths

- Relatively high geodiversity of the study area
- High cultural and historic value of some sites (Kaolin mine, Old limestone quarry)
- Proximity to the natural park of the Valley of White Creek
- Good potential for education
- High ecological (or zoological) value of some sites (caves, Maršov adit)
- Localization of the study area in the catchment area of the regional center (Brno)
- Regular scheduled transport
- Localization of geosites within walking distance from places of tourist infrastructure
- Existing network of hiking trails

Weaknesses

- Lack of promotion of the area
- The area is not known behind the borders of region
- Active limestone quarry negatively influences harmonious landscape
- Bad accessibility of some sites
- Lack of legislative protection

Opportunities

- Geopath leading through Maršov valley and its surroundings supplemented by information panels can serve as education for visitors
- Suitable terrain for walking and cycling
- Promotion of geoheritage can increase the attractiveness of the territory and bring the possibility of development of surrounding communities
- Study area is suitable for school trips (presence of tourist infrastructure near-by)
- Possibility of suggesting a draft of declaration of natural monument Maršov valley or to extend the natural park of White Creek and to better protect the geosites

Threats

- In the case of larger promotion of the area and due to following increasing attendance there can be a possibility of growing anthropogenic pressure on the sites
- Rubbish dumps and vandalism in the proximity of the sites
- Disturbation of important habitats, especially in caves and adits
- Continuing limestone extraction and further destruction of the karst phenomena

4.3 Synthesis and management proposals for selected sites

The site n. 1 Skalky is easily accessible and it has a high pedagogical potential thanks to its scientific value, so it could be used for education and geotourism purposes. However, the site is not known and there is no touristic marked path leading to the site. The information panel, which would clarify the geological and geomorphological conditions could be located on this site. In the case of better promotion, there is a possibility of disturbing this site especially due to illegal camping and vandalism.

The site n. 2 Kaolin mine is a very important site from the historical point of view. Even though the site is quite neglected and partly threatened by excessive erosion, there are possibilities on how to use the site; it could serve as a natural swimming pool and also as an educational site thanks to its strong geohistoric value. As kaolin deposits are not very common at the area, the site would also be suitable as an educational locality in the sense of stratigraphy and economic geology.

The site n. 3 Old limestone quarry is the best illustration of historic quarrying in the area. Here it can be seen that quarrying in the past had not had a big influence on the environment and after the end of extraction, the majority of old quarries can easily be incorporated into the surrounding landscape. In addition, close to the quarry, there is one of the few limekilns (called Havilek limekiln) that have been preserved in the region, so it is obvious that the site is really important from the historical and geological point of view. The site is often used as a campsite and unfortunately some visitors do not behave considerately towards nature, so the site suffers from vandalism and even the establishment of landfills. It would be appropriate to inform people not only of geoscience and historical aspects of the site, but also of the negative consequences of anthropogenic activities that could disturb the site.

The site n. 4 (Karst spring and Badger's cave) has undoubtedly high educational value because it represents typical karst phenomena. Given this value, it would be possible to use the site for geotouristic and geodidactic activities. It could also be incorporated (as other geosites in the area) into the geotouristic path. However, the access to the site is somewhat problematic – it is located in the steep slope on the right side of the Maršov valley, so there should be some terrain modifications (paths, stairs) done. The question is whether the improved accessibility of the site would lead to its destruction. Nevertheless, it would be appropriate to get information about this site because it represents the remains of an extensive cave system that have been quarried in the active limestone quarry in the vacinity.

The site n. 5 Maršov adit is a "forgotten place" that is particularly important in terms of ecology, as a refuge for bats. It is quite poorly accessible and practically unknown, but in this case, inaccessibility and low promotion of the site is suitable to preserve the ecological values of the site and to protect adequately fragile biotic component.

The site n. 6 Flodplain of Maršov stream is only slightly modified by anthropogenic activities and it is characterized by considerable diversity of fluvial mezo- and microforms. It is also quite easy to reach thanks to the road that leads through Maršov valley. The site could also be used for geoeducational purposes.

The site n. 7 Narrow cave is well known by speleologists, but due to its bad accessibility tourists do not visit it. As special equipment is needed for the exploring of the interior of the cave known,

it remains less attractive for other “common” visitors. The cave also serves as a refuge for bats, so it would be advisable to accept the management measures as described for the site n. 5 (Maršov adit) and to avoid high attendance for this site.
The site n. 8 Dřínová hill outcrop is an interesting site with regards to geological aspects. Two types of limestone meet here (massive and organodetritic) and the border between them is very clear. Due to the good accessibility of the site, its visibility and pedagogical potential, the site could be used for geoeducation, the information panel explaining the karst and limestone issues karst would be placed here and it could form one of the stops of suggested geopath.
Probably the best way how to promote local geoheritage is to suggest a geoscience trail with several stops where information panels could be placed.
Some of the sites are recorded in the Database of geosites kept by Czech Geological Survey (site n. 1 Skalky - ID 3456, site n. 2 Kaolin mine - ID 2255, site n. 3 Old limestone quarry – ID 3453, site n. 4 – Karst spring and Badger’s cave - ID 2257), karst features of the study area are recorded in the Database of speleological objects run by the Czech agency for natural conservation, so the information is freely accessible on internet.
To assure legal protection and conservation of the sites within the study area, there is a possibility to submit a proposal to declare natural monument (according to the Law 114/1992 Coll. anyone can submit the proposal to the competent administrative authority) or to extend the natural park of White Creek, which is situated on the south of the study area.

5 Conclusions

In the past, Maršov valley and the surrounding area was characterized by a harmonious coexistence of man and nature and the rational use of resources. On the contrary, today the area is affected by the anthropogenic activities which substantially changed the face of the area; this is most clearly seen in the large limestone quarry in the central part of the study area. Even though there are some sites preserved with high scientific and historical value that represents local geoheritage. Thanks to their relatively good accessibility, proximity to the tourist infrastructure and localization in the close surrounding of the regional center, the area could be used as a local geotourist destination.
The geoconservation activities in the Czech Republic were not adequately supported in the past, but the situation today is getting better both on national and regional and local level. On the national level, the national geoparks are declared and promoted, the nationwide databases of geoheritage are kept; on the regional and local level, there are various geotouristic activities (e.g. establishing geopaths, installing information panels, promoting local geoheritage on the websites of the municipalities etc.). The future of geoconservation in the Czech Republic depends on the close cooperation of the institutions and subjects that deal with geoconservation and geoheritage activities. Other important tasks for the future is to encourage scientists that somehow deal with geoconservation, geoheritage and geotourism (not only geoscientists, but also biologists, historians, archaeologists, sociologists, economists and pedagogues) to work together and create a platform for exchange of views, knowledge and experience.
The geomorphologic and geological components usually determines all the other components of the landscape, so they are very important and worthy of protection. The assessment of geoheritage and management proposals (especially geotouristic and geoeducational activities) can help to identify and promote geoheritage and appreciate its importance for both wildlife and the activities of human society. These activities can also significantly contribute to the understanding of the need to protect geoheritage.

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REVITALIZATION PLAN FOR NATURAL MONUMENT HOLÁSECKÁ JEZERA

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Abstract
Holásecká jezera is a system of artificial reservoirs on the Černovický potok stream. It was announced as a natural monument in 1987 with the aim of protection of the valuable wetland and water ecosystems and the remnants of a floodplain forest.
The location (12 ha of water and forest areas) still has no main administrator, and the approved management plan for specially protected areas has not been implemented. As a result of wrong or no management the habitat has been damaged by groups of people with both special and various interests – fishermen, nature conservationists, local citizens, water management experts, etc.
The goal of the Revitalisation Plan was to reach a compromise between these different interests and propose steps to proper area management. Different institutions became involved in the plan negotiation – South Moravian regional authority, water management expert company (Povodí Moravy a.s.), Brno City municipality, local administration Brno - Tuřany, Fishing Union Brno and two local citizens associations.

Keywords: nature conservation, protected area, leisure activities

Introduction

The natural monument (hereinafter NM) Holásecká jezera was announced in 1987 with the purpose of protecting a system of artificial reservoirs and wetlands with remnants of riparian stands. The site consists of 7 connected lakes (Kašpárkovo, Typfl, Kmuníčkovo, Roučkovo,Ledárenské, Plavecké, Strakovo) and 3 water bodies on the side (Kocábka, Lávka, Opleta); the total area is 12 hectares, out of which 6.3 ha is water bodies. The lakes were created by a gradual damming of an original arm of the Svitava River during the 20th century. The largest water body, Opleta, was created as late as at the beginning of the 1970s. The stream going through the system is the Černovický potok. Holásecká jezera is located in the southern part of Brno agglomeration and are one of the last remnants of preserved nature in a landscape heavily used by agriculture with a great pressure on an expansion of housing and commercial development (*Fig.1*).

Fig. 1: Wider territorial relations

Since the site was pronounced a protected area, no management has been implemented and everything has developed spontaneously. Management plans for the NM have been created,

including proposals of recommended and necessary measures, but the financial condition and mainly the unclear competences prevented implementation of any larger measures.
Mainly thanks to local inhabitants' interests, the city of Brno made an assignment of the NM Holásecká jezera Revitalization Project in 2005. Its implementation was supposed to be financed from EU grants. However, the financial demands of the proposed measures exceeded the expected numbers (the assumption was a total price of about 70 mil. Czk, out of which 11 mil. Czk on the part of Brno; the total price after project preparation was 92 mil. Czk, city's participation was 18.5 mil. Czk). Documentation processing was stopped in 2007 at the stage of planning permission as the project did not meet the conditions for an EU subsidy and the total price would have to be paid from the city budget.
In 2011, again thanks to local inhabitants' interests but also the elected representatives of city district Brno-Tuřany, where Holásecká jezera belong geographically, new discussions on the future of the NM were launched, with respect of the fact that the created project cannot be implemented. At this stage, the issue came under the competences of the Environment Department of the Brno City Council (*Fig.2*).

Fig. 2: Situation

Revitalization Plan preparation
The initial finding, when studying the available materials, was that the created NM Holásecká jezera Revitalization Project does not comply with the modern concepts of landscape care, especially care of specially protected areas. The project is too technical and after its implementation the site would probably become a system of fish-breeding reservoirs. Therefore, we had to approach the site with the aim to preserve natural values but also take into account other interests – leisure activities, sport fishing, water management and flood prevention. In cooperation with Atelier Fontes s.r.o. as the victorious provider of order "Holásecká jezera Revitalization Plan", we invited representatives of all relevant departments of the Brno City Council (Department of Territorial Planning and Development, Department of Water and Forest Management and Agriculture, Department of Investments), local citizens associations from city district Holásky, Department of Environment of the Regional Authority, Povodí Moravy a.s., representatives of city district Brno-Tuřany and Fishing Union Brno to the first executive committee. Out of the demands, which were sometimes very different, we defined four basic categories that should be respected by the new management concepts: water management, nature protection, fishing and leisure activities.

The current state

Water management

From the perspective of water management legislation, these lakes do not exist. In other words, no administrator has been set for these water bodies, the relevant permissions and rules (permission for water treatment, manipulation and operation rules) have not been dealt with. The survey of the volume of sediments, conducted in 2007, showed that five lakes (in the direction of water inflow) are nearly filled with ground, the size of sediments is from 50 cm to 1 m. Four other lakes are filled with ground to their half or two thirds, the largest and youngest lake, Opleta, has about 20 cm of sediments. The total volume of sediments is estimated to 27,000 m^3. The analysis of sediment quality confirmed pollution of the mud by polycyclic aromatic (PAU) and hydrocarbons C10-C40 in the upper, most sedimented, reservoirs.

Fishing management

The system of reservoirs is a part of a pronounced fishing district and there is a stocking duty stipulated. In 2008 The Moravian Fishing Union modified this duty, for the reasons of deteriorating conditions for fish breeding and fish life support. Due to the extensive sedimentation of the lakes, it is now possible to fish only in the southern bodies: Opleta, Kocábka, Lávka and Strakovo jezero, or Plavecké. It is interesting that the non-autochthonous phytophagous grass carp (*Ctenopharyngodon idella*) is permitted here, in the specially protected area, even though act no. 114/1992 Coll. conditions an expansion of non-autochthonous species by a nature protection authority consent, which has not been granted for this district. Fishermen are the most frequent visitors and users of the NM.

Leisure activities

The recreation potential of the site has been gradually deteriorating. This is probably the main reason for local inhabitants' activity. The older remember the lakes as important places for swimming; currently, swimming is only possible in Opleta. However, even there water is not really attractive; a regular sampling and quality testing is not done. This is due to the use of Opleta for fishing, fish feeding and the slight movement of water. Short-term recreation is possible by walking along the lakes using the trodden paths of various quality. After rains, these paths are muddy. The pass-overs between lakes are disintegrating. Greenery maintenance (trees, shrubs, grassy areas) is carried out only locally for the needs of users (fishermen, parking sites) and it is not controlled. Unpermitted burning off of reeds is often carried out.

Nature protection

In fact, the state of "no management" is favourable for the purposes of nature protection. Sedimentation is natural development and it leads to spontaneous expansion of wetlands, which are important breeding sites of amphibians. Stems of trees in water contribute to higher biodiversity. There is also the Eurasian beaver (*Castor fiber*) on the site. As the artificially planted cultivar of black poplar (*Populus nigra „italica*") is not maintained, it disintegrates in the close vicinity of a used path; also the pollard willows, which are not cut, pose a risk of breakage. In some places, invasive species are spread – *Robinia pseudoacacia* and *Acer negundo*. Out of botanically significant plant species, there are *Nuphar luteum* and *Epipactis helleborine*, woody plants include both species of elm (*Ulmus minor, Ulmus effusa*). Several specially protected birds nest in the stand regularly and several tens were recorded during migration. The NM has not enough flooded reed stands for possible occurrence of wetland birds and there is a high rate of their disturbance during nesting.

Specially protected area Management Plan

Until 2002 the management plant only focused on measures taken in the riparian stands; it did not deal with the water quality and sedimentation of the lakes. The management plant valid until 2012 recommended reducing of sediment washing from fields, removal of non-autochthonous plant species, reduction of fishing, control of tourists, and similar, but nothing of these has been implemented. In 2004 the project for territory revitalization started to be prepared and it is probable that none of the mentioned measures were taken as a complex treatment based on the project was expected. Now a new Management Plan is being prepared, valid until 2022.

Differing interests
Each of the interest groups of “users” of NM has different priorities. Fishermen would welcome removal of mud and better quality of water for the fish. Water managers demand minimum through flow on the lake outflow and elevated water levels during floods without spill to the surrounding inhabited areas. People using the NM for leisure would welcome maintained relaxation places, a reinforced trail, safety of the trees, etc. Nature protection authorities demand maintained conditions for breeding of amphibians, undisturbed nesting of birds, natural processes and age variety of riparian and surrounding stands, control of tourists.

Results
The main aim of the Holásecká jezera Revitalization Plan was to find an acceptable agreement on the usage of the site and propose measures that could be taken immediately as well as measures with a longer term that could be taken when finances allow.

One of the main points of argument was the necessity to remove sediments from the lakes. After considering all four main interests (water management, leisure, fishing, nature protection) we reached the conclusion that removal of sediments is not necessary at the moment – it is highly financially demanding, a part of the sediment would have to be disposed of as dangerous waste, there are no protected species in the NM that would demand that, the capacity of the water bodies and the closest surroundings can take flood Q100 without a spill (estimate calculation made). However, in the future, removal of sediments will be necessary due to the flow capacity. The time horizon will depend on the speed of further sedimentation (sediments from inflow, fall of leaves and wood mass, etc.).

The issue of collisions of leisure and nature protection will be solved by the site division into zones. There will be 3 categories of zones – natural, natural-recreational and recreational. In the natural zone, an undisturbed existence of natural sites without human effect but with regular monitoring will be a priority. Entrance to this zone will be blocked by biotechnical means (ramparts made of branches, stems, etc.). The lakes in this zone will not be used for fishing. This natural zone will make 34% of the area.
The recreational zone will allow tourists to enter everywhere; it will be regularly maintained and mowed. Leisure facilities and suitable accesses to water are proposed, water will be used for fishing. This recreational zone will represent 27% of the area.
The natural-recreational zone allows people on marked trails; their stay is controlled and restricted to defined maintained areas. There will be vantage points for observations of nature. The fish stock will be controlled as regards the species. This zone will contain 39% of the area of the NM.
We assume that the division into zones and consistent maintenance of the recreational areas will reduce entries of tourists in the natural zone. There will be a reinforced path with several information boards in the NM, which will lead the tourists through the site. The boards will provide information on the NM, reasons for protection, species that can be seen and other interesting facts.

The revitalization plan also deals with the water management system of the lakes because some technical features are at the boundary of their life, e.g. culverts between lakes, the disintegrating reinforced concrete of Opleta, outlet facilities. When surveying the lakes, unexpected technical features were found, e.g. pipe bypasses of the lakes, probably never working water outlet of Opleta, supply of Opleta by underground water without inclusion in the lake system, etc. The newly designed technical measures support creation of new littoral parts in the lakes for expansion of reeds, prevention of fish entrance in Strakovo jezero by a gravel grid, new close-to-nature reinforcement of Opleta and others. The detailed project documentation of constructions will be created in the following years.

The last essential task of the plan was to create the procedure for measure implementation based on importance and respecting financial resources. The administrator of the water system and the natural monument will be Brno City, as an owner of the majority of lands. We cannot assume that the whole financial amount for maintenance and repairs will be provided at a time. The initial measure, which has been taken since autumn 2012, is maintenance of woody plants from the perspective of operational safety. In spring 2013, maintenance of the areas

in the recreational zone will start – mowing, cutting of trees and shrubs along the existing path. In the years to follow, based on the available amount of finances or possible granting of EU subsidies, a reinforced path will be constructed, information boards, leisure facilities, repairs of technical features will start as well as the expansion of littoral zones.

During negotiations and creation of the Plan, interesting situations appeared, mainly when discussing who will take care of the NM and who will finance the measures. Brno City is an owner of 98% of the lands but the expert authority for nature protection in compliance with act on nature protection (no.114/1992 Coll.) is the Regional Authority. The Regional Authority approves the management plan but is not able to finance investment measures. Fishermen use the water bodies based on fish breeding decrees. Povodí Moravy administers the Černovický potok flowing through the lakes only up to the point of inflow in the first lake and starting from the outflow from the last lake. Lands of Brno City are not within custody of city district Brno-Tuřany and their maintenance has no financial solution. In fact, this is a vicious circle, where everybody transfers responsibility to others and all have their part of the truth. This situation with unclear competences will probably occur on other sites too. This territory was hit by the thirty-year-long non-maintenance and almost disappearance of the purpose for which the NM was pronounced.

Conclusion

The Holásecká jezera Revitalization Plan created a conception of management plan for the valuable natural site respecting differing interests. Protection of natural values is highly important, especially in large towns like Brno, but we will not do without an explanation why we protect these sites and without offering them to people at least for a partial use. Although at the beginning of negotiations it seemed that agreement will not be possible, the last committee ended in satisfaction of all participants. Communication of authorities, interest groups and citizen associations is the right way to successful nature protection.

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SELVA NEGRA IN NICARAGUA – ORGANIC COFFEE GROWING AND TOURISTS GENERATING ENERGY

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Abstract
Ecological farm Hammonia La Selva Negra is located near the city of Matagalpa in northern Nicaragua. The territory is located in a mountainous area; the highest peak of the farm reaches 1570 m above the sea level. In 1975, the German family Eddy and Mausi Kuhl bought land and converted it to an ecologically managed company with 200 employees. At harvest time, the population of the organic farm is more than tripled. The farm is self-sustainable in energy generation, the island system combines water and solar source of electricity and waste from toilets is used to produce gas for cooking. More than a million coffee bushes are fertilized by locally produced compost, which Californian earthworms help to change from bio waste. Along with tourists, the community of 600 people fills only one waste bin, everything else is recycled, composted or fed to livestock. On 450 ha, the farm prospers from the sale of organic coffee to the United States of America, but especially from 5000 tourists who come here every year to admire this picturesque place. In addition to the meaningful work that is offered to 200 farm workers and their families, Selva Negra saved the beautiful tropical rainforest of 150 hectares with a wide range of Central American plants and animals.

Key words: Nicaragua, tropical rainforest, evaluation, agro tourism, nature protection

Introduction

Tropical countries are often criticized because of the callous approach to the environment. Both on a state-owned and a private property owned by wealthy businessmen from Europe, we often observe pollution of nature and exploitation of the poorest communities, which here in Europe would be impossible. The example of the farm of German immigrant descendants, Selva Negra, in the north of poor Central American Nicaragua shows a different approach to nature and to the local population. The location was visited by forestry students in autumn 2012 within the NIKAZAM project and the friendly owner spent a lot of time with us, so we could understand not only the benefits for the diverse nature of the tropical mountain forest, but also for local residents, who have been happily living here by third generation. Social benefits they receive at Selva Negra are in Nicaragua but in fact in the entire developed world something unprecedented. In the future, the aim is to look for alternatives that are really sustainable. The owner looks for work at the farm even for the local community of employees that graduate from higher education they obtain in cities. They can return to Selva Negra and receive a more expert position at the farm. They can even create this kind of a working position if it brings something beneficial to the farm.
Notable is the fact that the area is only about 11 km from the sixth largest city in Nicaragua - Matagalpa, with about 100,000 inhabitants. This city is called the Pearl of the North and is undoubtedly one of the most important cities in Nicaragua. The area was once inhabited by American Indians, with their own language, which was destroyed in 1875. Large expanses were deforested and converted to pasture, coffee plantations and agricultural land. The forest saved by the German family is a typical example of a mountain rainforest of northern Nicaragua, the forest that conceals immense species richness and which is under great pressure of another land use. Not only that, the farm produces more than it consumes, is energetically independent and the ecologically grown coffee goes to the United States, where customers certainly do not know that a million coffee trees is maintained in high fertility by organic fertilizer made by millions of earthworms and other decomposers that the farmer uses.

Farm La Hammonia Selva Negra

Agricultural Farm Selva Negra is located ten kilometres north of Matagalpa, which lies in the northern part of Nicaragua (Fig. 1). The ecological farm consists of interwoven forest paths, agriculture pastures, fields and coffee plantations, which are grown in the shade of other woody plants and banana trees. The farm was named by German immigrants - Hans Boesch's family - in 1890 in memory of the German Schwarzwald. The farm was bought by the Kuhl family, another German family, in 1975 and it was gradually transformed into a thriving

ecological farm with accommodation for tourists. The farm occupies 450 hectares in the mountainous landscape; the Selva Negra´s highest peak reaches 1570 m above sea level. One third of the property was left to spontaneous development, there is a preserved mountain rainforest. This is a part of a larger reserve Cerro Arenal (Reserva Natural Cerro Arenal), which takes area of 1500 ha and is a part of a Nicaraguan network of 20 reserves (Cooper, 2007a). The reserve has 36 owners; one of them is the family of Eddy and Mausi Kühl at farm Selva Negra. This reserve is also important for the city of Matagalpa as a source of drinking water.

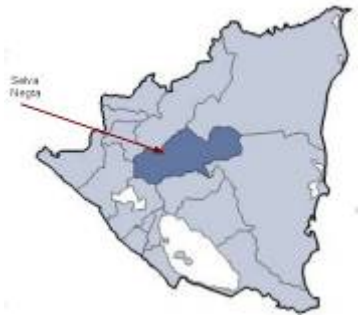

Fig. 1 and 2: Location of farm Selva Negra in Nicaragua (Source Wikipedia, 2013b)

Climatically, the area of Matagalpa in Nicaragua is humid with temperatures of 26-28 ° C, humidity 75% to 85% and rainfall of 1.200 to 1.900 mm (Wikipedia, 2013). Because of the fact that most of the Selva Negra farm lies at an altitude of 1200-1500 meters a.s.l., there will be a higher rainfall and lower temperatures than in the lower Matagalpa, but more detailed data from the farm are not available. Slopes inclined to the west are drier than the eastern slopes; prevailing winds from the Atlantic bring abundant rainfalls here. Because the property is a natural border between the area inclined to the Pacific and the Atlantic, fauna and flora represents taxa of both regions and is thus highly varied (Cooper, 2007a). However, the artificial reservoirs of the farm are also important for the diversity.
Selva Negra forest territory belongs to the ecosystem of the tropical mountain rainforest, the tops with a thick layer of moss and epiphytes belong to misty mountain forests. The lower part of the farm with the mountain rainforest is characterized by giant trees of the family *Fagaceae, Moraceae, Sapotaceae, Fabaceae, Mimosaceae, Meliaceae* and others. There are huge fig trees (*Ficus*), oaks (*Quercus*), sapodillo plums (*Manilcara*) or mahogany (*Cedrela, Swietenia macrophylla*), some even reaching over 40 meters (Obregon, 2007, Cooper, 2007b). The boards on some trees of the reserve indicate a height up to 55 meters (*Couropita*). The trees are covered with epiphytes of the families *Orchidaceae* and *Bromeliaceae*, also ferns. The highest places of the farm are the misty mountain forest, where there species from the *Ericaceae* family and *Melastomataceae* are increasing, the forest is lower, widely covered, in addition to the mentioned orchids and bromeliads, also with mosses. Furthermore, bamboos and tree ferns are also attractive (Cooper, 2007b).
Detailed ornithological research was conducted by Cooper, 2007b at Selva Negra and 4 other ecological coffee farms. They found the richest ornifauna with 131 species of birds at Selva Negra. The study also compared the incidence of endangered species of birds, and there were many rare species (21 taxa). Köhler (2005) conducted a survey of amphibians and snakes. Out of the 232 species known from Nicaragua, 19 species of amphibians and 33 species of snakes were found there, which makes, even though the author assumes other species, a total of about 25% of all Nicaraguan species of this endangered group of animals.

Local and tourist communities at farm Selva Negra
A number of publications have been devotes to a general threat of humanity through increasing concentrations of carbon oxides and other gases in the atmosphere, and there are not many positive examples showing the path. Farm Selva Negra is one of economically prosperous businesses that decrease the carbon footprint. According to Kühl (2013), Selva Negra absorbs 580 tons of carbon dioxide and emits only 201.8 tons. The carbon negative balance is carefully planned and precisely controlled. Ecological farming uses only local fertilizers that are created by African and Californian earthworms from manure and organic waste. Protection against fungi and harmful insects is provided by biological solution, which is produced at the farm. 200 employees and their families are not only self-sufficient in food production; they produce

enough even for 5000 tourists who annually visit the farm and stay at one of its accommodation facilities. Agro tourism predominates in drier parts of the year, especially at harvest time when about a million coffee shrubs are harvested (Heile, 2012). Pasture and agricultural organization of the farm is strictly purposeful, every meter is used; there are edible windbreaks along the roads, where fruit trees, herbs and trees with quality timber are grown. Seedlings of the plants are also grown in Selva Negra.
Electric power is generated from solar panels and water power plants, the sun heats water for washing, which runs down from the mountain rainforest located above the hotel and is retained in reservoirs. Even manure and toilets are used to gain energy: biogas is produced and used for cooking. Along with the tourist, this community of around 600 people fills only one waste bin per week, everything else is recycled, composted or fed to livestock. Lopez (board of Selva Negra, date unknown) shows a clear decline in energy use of the farm. Ecological footprint (WWF, 2012) is very low, the farm, according to some authors, produces more energy than it consumes. Also the social security scheme of the farm is unprecedented in comparison with Nicaragua and generally with the developed world. In the future, the aim is to look for alternatives that will keep the families in here at meaningful and fairly paid work. At harvest time, the 200 employees - local residents – are helped by seasonal workers who harvest coffee fruits to braided baskets. The population of the ecofarm is more than tripled. Care for these descendants of American Indians and Spanish immigrants includes not only a steady income, but also access to health care for school children and three meals per day, all grown on the land of Selva Negra in bio quality.
The farm is profitable, thriving not only from the sale of organic coffee to the United States of America, but mainly from expenditures of 5000 tourists who come here every year to admire this picturesque place, the fresh mountain air, as well as the beautiful and unspoiled nature.

Material and Methodology
Farm Selva Negra with its 450 ha in the northern part of Nicaragua protects the mountain rainforest on the third of its area, 150 ha. It is a size comparable with Czech natural reserves. It can therefore be assessed based on the Methodology for Assessing the State and Management of Small-area Specially Protected Areas (Svátek, Buček, 2005), which was tested in the Czech Republic (Svátek, Buček 2007). The assessment was carried out within the excursion of the Nikazam project on November 16-17, 2012 (NIKAZAM, 2013).
The method is based on the assessment of the state of the territory and its management, each is evaluated by eight criteria, presented in Table 1.

Tab. 1: Criteria for the state and management of a protected area

Criteria for the assessment of the current state of the area	**Criteria for the assessment of the area management**
preservation	documentation
structure	marking of borders
major species	roads
reproduction	protection zone
recovery disruption	reduction of external negative influences
invasive and expansive species	recovery management
landfill or garbage	interventions
other negative effects	reaching the protection objectives

The current state and management of the protected area is evaluated based on the scale listed in Table 2. To distinguish the importance of individual criteria, each of them was assigned with a multiple coefficient (presented in Tables 3 and 4). A multiple coefficient is fixed, the evaluator cannot change it. The final evaluation of the current state of the protected area is then calculated as a percentage of the total number of points obtained from the maximum possible number (100) of points, which can be gained for the assessed state criteria.

Tab. 2: Scale for the assessment of individual criteria of state and management

degree	meaning
0	extremely low
1	very bad
2	bad
3	average
4	good
5	outstanding

Tab. 3: The procedure of the assessment of the current state of the protected area

number of criterion	criterion of the assessment of the current state of the area	degree	multiple coefficient	score
i		S_i	k_i	$S_i \times k_i$
1	preservation	0–5	3	...
2	structure	0–5	2,5	...
3	major species	0–5	2	...
4	reproduction	0–5	1,5	...
5	recovery disruption	0–5	1,5	...
6	invasive and expansive species	0–5	1	...
7	landfill or garbage	0–5	1	...
8	other negative effects	0–5	1,5	...

Tab. 4: The procedure of the assessment of the management of the protected area

number of criterion	criterion of the assessment of the area management	degree	multiple coefficient	score
I		S_i	k_i	$S_i \times k_i$
1	documentation	0–5	1	...
2	marking of borders	0–5	1	...
3	roads	0–5	1,5	...
4	protection zone	0–5	1,5	...
5	reduction of external negative influences	0–5	1,5	...
6	recovery management	0–5	2	...
7	interventions	0–5	2,5	...
8	reaching the protection objectives	0–5	3	...

Each of the 16 criteria listed in Tab. 1 and 2 is evaluated by a grade based on the following verbal numeric scale in Tab. 5. For each criterion, grade 0 indicates the worst (lowest) evaluation, grade 5 indicates the best (highest) evaluation. For all criteria, therefore, this applies: the higher grade, the better rating. The current state and management in the area is therefore evaluated as follows:

Tab. 5: Scale of the resulting assessment of specially protected area

A_{state}	The resulting assessment of the current state
0 – 30	very bad
31 – 50	bad
51 – 71	average
71 – 90	good
91 – 100	outstanding

Results

The assessment of the individual criteria of nature reserve Selva Negra is presented in Fig. 3.

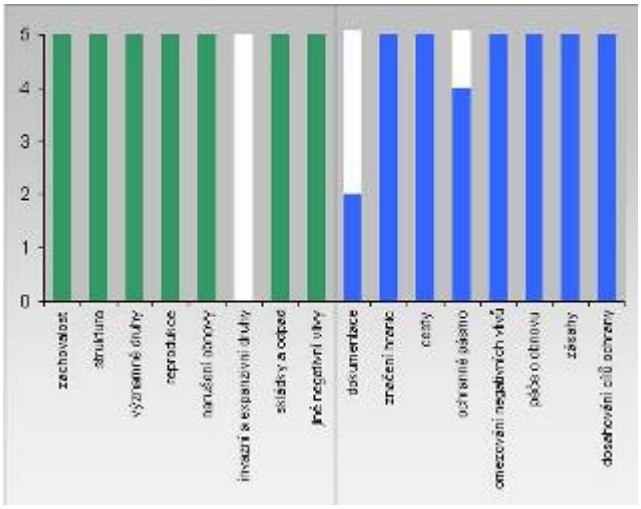

Fig. 3: Assessment of the state and management in nature reserve Selva Negra

Preservation: The original mountain rainforest with minimal disruption. According to Heile (2012), a scientist from the National Geographic, it is a primary forest, despite the fact that near the farm there are visible traces of human activity. The reserve was evaluated as very well-preserved by the most extensive research that took place here (Cooper, 2007a, b). The tree species composition and the canopy integrity of Selva Negra classifies it as a typical primary forest of tropical rainforest biome, there are abundantly represented epiphytes, lianas or stranglers. There are also huge trees, for example *Couropita* sp. of the family *Lecythidaceae* which reaches a respectable size (according to the board on the tree, 55 meters).

Structure: This is a primary forest, all developmental stages of primary forest dynamics are present, frequently occurring dead wood.

Major species: Forest with species of the family *Fagaceae, Moracaeae, Cyathaceae* and others that create the mountain rainforest. There is a diverse composition of animal species with toucans, hummingbirds, sloths, peccary, mantled howlers. Especially the research Cooper (2007b), which compared the occurrence of birds at 5 farms in the northern mountains of Nicaragua, discovered extraordinary species richness at Selva Negra with 131 species, out of which 21 are endangered. Even studies of amphibians and snakes show a high species biodiversity and integrity of the Selva Negra ecosystem (Köhler, 2005). During my brief survey hummingbirds and mantled howlers were observed. The diversity of epiphytic plants was remarkable with species of the family *Bromeliaceae, Orchidaceae* and ferns (Fig. 4). At higher altitudes, the occurrence of tree species of ferns and bamboos was significant.

Fig. 4: Tree of the main level covered with epiphytes in the Selva Negra reserve

Reproduction: According to the available inventories (Cooper, 2007a; Köhler, 2005 and Obregon, 2007), the community behaves in a healthy way, none of the authors mentioned a decline of original species of plants or animals. During our observation, an abundant occurrence of plants in the undergrowth including tropical species of oak (*Quercus*), fig (*Ficus*) or seedlings of orchids on the tree branches were observed.

Invasive and expansive species were not evaluated due to the missing knowledge of local fauna and flora, however, the inventories (Obregon, 2007a) mention an occurrence of some unoriginal woody species that are grown in the farm, including for example *Eucalyptus* or other utility plants, involving a number of fruit trees. However, no penetration into natural ecosystem has been marked.

Neither landfills nor garbage were noticed, not even along the tourist trails, thanks to the exemplary management of the farm owners. As has been mentioned, waste is properly separated and recycled. **No other negative effects** have been recorded that could influence the subject of nature reserve protection, perhaps occasional night noise which pervades the night from the some of the tourist accommodation facilities.

Documentation: There is a maintenance plan - Plan de Manejo de la Reserva Natural Cerro Arenal - which is a bigger protected area covering 1500 ha, Selva Negra forming its part (MARENA, 2003). This huge protected area is owned by other 35 private owners.

Marking of borders was not evaluated. According to local norms it is not obligatory. However, the owner pays attention to the reserve borders, especially to prevent livestock from penetrating to the reserve and to make tourist walk on marked trails.

Roads have been designed wisely in order to show visitors the variety of ecosystems and attractions (for example huge trees) as well as views of the landscape. The forest trail network of about 20 km enables visitors to walk through the natural reserve including the highest ridge of 1500 m a.s.l., at the same time, it preserves the most precious places free of visits. The roads are very well maintained, which is a very difficult intensive process in the case of tropical rainforest. Everything rots faster and surges of water are significant, especially during the rainy season. Farm excursions are done in minibuses organised by the owner, individual transport is significantly limited.

Protection zone: In the surroundings of the Selva Negra reserve the use of landscape is close to nature. Especially the other 150 ha are coffee plantations grown in the shade of the secondary forest and banana trees, which is beneficiary both for coffee and owners, because of its additional economic utility. It is convenient also for plant and animal world because many species find their temporal or permanent place to live.

Reduction of external negative influences: Tourists are guided so that the landscape is influenced as little as possible, other influences are not obvious.

Recovery management is not necessary because it is a primary forest ecosystem very close to nature. Spontaneous reproduction processes work perfectly.

Interventions: The owner perfectly maintains paths for tourists and tourist marking. Part of the forest is inaccessible, which is appreciated by demure species.

Reaching the protection objectives: The protected area fulfils its mission. Thanks to the new artificial reservoirs, the diversity of species is higher in comparison to the previous years, when the owners purchased Selva Negra. The owners avoid using chemical fertilisers or other

products for plant protection. They develop biological agents on the basis of plant extracts. Not only this, the area is self-sufficient also energetically, except for petrol necessary for machinery, which is purchased. The farm produces its power and hot water by solar panels and water power plants and gas for cooking from biogas station (recycling livestock manure and tourists and employees toilets). The farm demonstrates agro touristic business, which is permanently sustainable at the local as well as global level.

Table 6: Scale of the final assessment of the state of the protected areas

Final assessment

Current state of Selva Negra - Nikaragua	degree	multiple coefficinet	score	Reserve management of Selva Negra - Nikaragua	degree	multiple coefficinet	score
preservation	5	3	15	documentation	2	1	2
structure	5	2,5	11	marking of borders	n	1	
major species	5	2	10	roads	5	1,5	7,5
reproduction	5	1,5	7,5	protection zone	4	1,5	6
recovery disruption	5	1,5	7,5	reduction of external negative influences	5	1,5	7,5
invasive and expansive species	n	1		recovery management	5	2	10
landfill or garbage	5	1	5	interventions	5	2,5	12,5
other negative effects	5	1,5	7,5	reaching the protection objectives	5	3	15
final assessment of the current state	A_{state} = **100 (outstanding)**			**final assessment of the management**	$A_{management}$ = **93 (outstanding)**		

According to the methodological assessment of small-area protected areas, Selva Negra obtained excellent results both in management and the current state. Out of 100 points, which can a protected area reach at maximum, the current state reached 100, the management 93. The assessment was lowered due to the incomplete maintenance plan (observed through the eyes of European maintenance plans). The assessment of the reserve discovered that not only the state of forest reserves, but also their management can be of a very high quality even in a poor country, such as Nicaragua.

Conclusion

Coffee farm La Hammonia Selva Negra in the northern mountainous part of Nicaragua produces ecologically grown coffee of high quality. Neither chemical fertilisers nor pesticides are used during its cultivation. Biological agents for protection and the compost are produced by the farm. Selva Negra is practically self-sustainable also from the energy point of view, thanks to the usage of the sun, water and biogas. There is also a hotel with a restaurant for nature lovers, which annually receives 5000 visitors. They visit the coffee plantation that is grown in the shade, and also the primary forest, which was left to its spontaneous development on one third of the farm. The forest reserve preserves a very rich ecosystem of the mountain rainforest. It was assessed based on the Czech Methodology for Assessing the State and Management of Small-area Specially Protected Areas. The results demonstrated that the state and management of this area is of excellent quality. Cooper (2007b) achieved similar results, which were compared to another 5 ecological farms with organic grown coffee trees for American customers of organic coffee. Selva Negra was the best. Despite the fact that Nicaragua belongs to the poorest country of tropical America, employees of ecological farm Selva negra are very well paid. Apart from food, which they produce themselves, they are provided health care and education. Happy Planet Index, which is an alternative to GDP (Murphy, 2012) placed Nicaragua to the 8th place in the world chart, due to the high average expectation people reach here, satisfaction they feel, and low ecological footprint, which is load of nature measured in hectares. Although you will see a lot of poverty in other places of this country, people and other diverse creatures live well in the mountains of Selva Negra.

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SITE OF COMMUNITY IMPORTANCE ROCHUS – SEARCHING FOR A SUSTAINABLE WAY OF USAGE

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Arvita P spol. s r.o.

Abstract
This paper deals with possible recreation use of a former military training area – today SCI Rochus – for inhabitants of Uherské Hradiště and its surroundings. The environmental, cultural and historical, as well as aesthetic potentials of the site are specified and options as well as limits for its use are proposed. The procedure is described: a study – territorial plan – complex land modifications – implementation.

Key words: Landscape management concept, recreation, management

Introduction

The former military training area Rochus is located in the suburban part of Uherské Hradiště. The site with about 60 ha is a green island formed from a mosaic of shrubs and meadows in the middle of intensively agriculturally used and urbanized landscape with a numerous occurrence of specially protected species of animals, plants and valuable habitats.

Material and methods

When the military activities ended on the site, a possible future use as nature-cultural and recreation area was searched for. The first study Composed Landscape Rochus by prof. Otruba was finished in 2007 and it contains a concept of two interwoven landscapes in which a new, cross-shaped layer, clearly defined and respecting the original values, is added into the existing matrix.

Consequently, an investment project was created (Arvita P spol.s r.o., 2010), which mainly prepared spatial and organizational conditions for the connection of the spiritual and natural landscape with the aim to create an area interesting for human beings as well as nature while all the current values are retained and increased. This project was assessed from the points of view of impact on SCI Rochus and other interests of nature and landscape conservation.

Based on the conducted studies, analyses, expert's opinions and commentaries of the Zlín Regional Authority, partners, citizens and authorities of Uherské Hradiště, the total concept of functional areas was incorporated in the new territorial plan of Uherské Hradiště.

At the same time, Land Management Office Uherské Hradiště launched land consolidation measures in Rochus, cadastral areas of Mařatice and Jarošov. The land consolidation measures will contribute to the solution of ownership relations of the lands, better access to the site and rational use of the agricultural land.

Results

The cornerstone of the sustainable usage proposal was a detailed biological inventory of the site. In total, 30 plant species were found based on the Red List of Vascular Plants of the Czech Republic. As regards the zoological component, 105 bird species, 11 mammal species, 4 amphibian species, 2 snake species, 81 species of ground beetles (*Carabidae*), 26 ant species, 52 butterfly species with a daily activity and a number of species of other insects and arachnids were found.

The survey found 48 specially protected species listed in Appendix of Decree 395/1992 Coll. Out of these, 33 species are listed in the endangered species, ten are in the category of strongly endangered species and two are within critically endangered species. Eleven of the found animal species are significant species of Natura 2000.

Site of Community Importance (SCI) Rochus was announced based on the occurrence of a species of community importance - *Eriogaster catax*. A central *core zone* was delimited for its protection. The zone will serve the purposes of maintaining and improving of conditions of its habitat. The activities on the site are controlled by the Management Plan for SCI Rochus.

The project preparation of the site followed prof. Otruba's proposal, which is a simple but functionally and aesthetically perfect concept of composed landscape. Four tree alleys go from different sides towards the cultural and spiritual centre of the site – St. Rochus Chapel.

The investment project as a complex coordination document specifying the current state and the presumed concept of development of activities in SCI Rochus defined the interests of nature

conservation as a priority, including the management proposal, and also reflected needs of the town in the constructions and the specific solutions of the site parts:

Composed landscape

The orchard layout is cross-shaped and the cross is expressed by waving tree alleys. Rays go from the centre to a distance. Thus they connect other sceneries or symbolize St. Rochus protection. This is achieved using geometric – straight or circular tree alleys.
The composed landscape makes use of site-autochthonous species of woody plants (trees and shrubs) and regional species of fruit trees. The site communicates with the Nature Park Prakšická vrchovina by means of landscape elements. *Prunus spinosa* and *Crataegus* are preferred for this ray as well as the currents going through the core zone.
The natural space is complemented with other orchard elements, such as fruit orchards, expositions of plants, a natural labyrinth and a low forest. Gradually, education trails and attractive views of the landscape are created.

St. Rochus Chapel

The Baroque St. Rochus Chapel is a dominant feature of the site and a significant centre of pilgrimage. The chapel was built in memory of the plague that hit Uherské Hradiště in 1680. It was restored to the appearance of the original pilgrimage chapel in 2009.

Open air museum

An exposition of an authentic regional village is being prepared at the edge of the park adjacent to Mařatice vineyards to preserve and present an important part of the cultural heritage of the Uherské Hradiště district. There will be buildings transferred from their original locations and examples of all types of original rural buildings.
There will also be green areas, including expositions of farming in the landscape (meadows and orchards, a vineyard). The museum facilities will also be used for manual production and presentation of traditional crafts and customs with focus on wine making and vineyard management. Besides cultural and educational functions, the museum will also perform cultural and social function as a place for folk and other programs and events.

Environmental centre

The centre will be included in the open air museum and will provide education in the field of nature and environment protection. Further, it will organize exhibitions, workshops and other programs, as well as education to maintain traditions of our ancestors and a sustainable way of life.

Ecofarm
To provide eco-friendly management and maintenance of the site, a service farm with a sheepfold and a hayloft is designed. It will be the centre of traditional farming in the landscape by pasture, orchards, beekeeping and close-to-nature production of all related regional products. The management of the extensive pasture is proposed for the SCI and a large part of the connected areas.

Sports activities

The nature part of the area neighbours with the space of a skiing slope and an intended sport-relaxation centre for summer and winter sports as well as a complex recreation use for families with children. The connected areas of the countryside will make other soft forms of leisure possible.

Accessibility and roads on the site

The accessibility is based on the current dirt and surfaced roads, which go around the site so that the core zone of SCI Rochus is not fragmented. The reconstructed or designed reinforced roads will be also used as new biking trails.
Hiking is supposed to take place on slightly reinforced surfaces that will be parts of vegetation currents, education and pilgrimage trails. When the core zone is provided access to, we expect formation of "grass roads" which will be created by repeated mowing of the grass. The routing of these roads will change every year, which will ensure the demanded disruption of the turf. Similarly, these trails will be used as sheep drive paths or horse riding trails.
The trails will be equipped with directions signs, information boards, vantage gazebos, resting places and benches. Lighting is only assumed at selected places, i.e. at the main reinforced roads and pilgrimage trails.

The investment project was assessed when in progress and after finishing from the point of view of the project effect on sites of community importance and bird areas in compliance with Art. 45i of Act no.114/1992 Coll., as amended. The conclusions and recommendations provided in this assessment have been added to the project.

Discussion

The project of the revitalization of a military training area and SCI Rochus represents a unique case of searching for a sustainable form of using a site of community importance which is a part of Natura 2000 (see appendix 1) with an immediate vicinity of a town – Uherské Hradiště, which is at the same time the main initiator of the project.
The individual stages of the project preparation were collaborated on by many parties, including the town citizens. The negotiations have also brought a wide range of opinions regarding the usage of the interest area – from leaving the site for its spontaneous succession up to a kind of "Disneyland".
The investor was able minimize risks of damage of the natural environment to the maximum extent and propose attractive forms of the site usage. The quality of the project has also been confirmed by the fact that the project Park Rochus gained award "The best project of 2012" from the Association for Urbanism and Territorial Planning. The committee appreciated the partial implementation of the project, its novelty and unconventional solution, the application of sustainable territorial development principles as well as the favourable connection of urbanism solution with nature conservation.
In spite of all favourable aspects, there are still some troubles, such as the ownership relations of the lands and gaining sufficient financial means for the implementation as well as providing the sustainability.
The project sustainability is considerably promoted by the wide range of already existing activities, and more are joining in. It is e.g. an important private project providing vineyard traditions Mařatský dvůr or inclusion of Park Rochus in the education sub-project "Together towards sustainable development", co-financed from the Fund of Environmental Professionalism" within Swiss Funds. Also thanks to this project, the natural area of the Park Rochus will become a living textbook on ecological education, especially as concerns sustainable management of the landscape and nature conservation.

Conclusion

Park Rochus – a public beneficial company – has been established to implement the project. Besides the main partners (Town Uherské Hradiště, Synot Real Estate, a.s.), Slovácké muzeum in Uherské Hradiště, the Zlín region and a number of cooperating organizations in the fields of protection of the environment and the cultural heritage of Slovácko, education, leisure activities and regional development participate.
The company has a lot of activities – in 2010 they managed the greenery and planted the first 100 trees to symbolically launch the regeneration of natural areas. Since 2011, a gradual implementation of partial subsidy projects has been going on; the first stage of regeneration of Rochus is planned to be finished in 2015.

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SMALL RECREATION RESERVOIRS

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Abstract
At present, the society once again returns to the use of small water reservoirs for recreational activities, especially windsurfing, water skiing, dragon boat races and endurance swimming. This requires not only securing water areas with water quality but also the arrival and access to water, restrooms, refreshments, parking, etc. It is necessary to resolve the ownership rights to water bodies, but also to the neighbouring land, often in legally very complex and ambiguously defined situations. In this article, we identify these situations and find appropriate solutions.

Keywords: water bodies, swimming pool, landscape potential

Introduction

Recreational reservoirs are small reservoirs for bathing and water sports. They have special facilities, a modified access to the water, and specific regulations valid around the reservoir; theyincludenaturalswimming pools, reservoirs for water sports (sailing, windsurfing) and special natural swimming pools.

Materials and Methods

When evaluating the suitability of small reservoirs for recreation, it is necessary to take into account the geographic location, climatic conditions, water temperature, quality and health safety of water, hydrology, size, sceneryof water areas and in particular its surroundings and the availability of suitable roads. When assessing the small reservoirsuitability for recreational purposes (swimming), itis necessary to focus on the following findings:
a) Zones of hygienic safety of water sources (no use of water reservoirs for recreation);
b) Local factors - the size of free space around the reservoir, accessibility to water, the composition of the soil at the point of access into the reservoir, natural pool facilities, attractiveness of the pool, camping opportunities, accessible roads, hygiene measures;
c) Factors of water quality and air quality (physical, chemical and biological properties of water and air);
d) The expected level of reservoir eutrophication;
e) Fluctuation level in the reservoir, etc.

Assessing the water quality for swimming

Water quality requirements for recreational use in many cases determine the usability ofreservoirs for water recreation. Indicators of water quality suitable for swimming in wide open spaces are provided in regulationand its methodical instructions no. 135/2004Coll. The criteria for assessing the quality of water suitable for swimming in terms of microbial contamination are provided in the Guidelineof the European Parliament and Council 2006/7/EC.

a) Water unsuitable for swimming, not fulfilling the hygiene requirements is a risk to health, (red colour). This stage is reached, if the water meets at least one of the following conditions:
- cyanobacteria - when the amount of cyanobacteria from the last test exceeded 100,000 cells / ml, while the concentration of chlorophyll-a exceeds the limit of 50 µg / l;
- microbiological indicators - the results of the testof at least one bacterial indicators did not correspond in the previous season and more than 5% of the samples exceeded the limits, at least at two consecutive samplings limits of Regulation 135/2004/Coll.were exceeded at least at one of microbiological parameters;
- sensor-perceived properties- visible pollution, odour, oil film, foam, etc. on the surface of such extent that it is virtually impossible to use the area for leisure.

b) Water unsafe for swimming is characterized by black colour; there is an acute risk of injury. Bathing prohibition is declared when one of these conditionsis fulfilled:
- cyanobacteria - occurrence of algal blooms atthe sampling point and outside, where there is possibility of its movement by wind; where the discovery of cyanobacteria significantly exceeds 100,000 cells / ml, and cyanobacteria, not forming water blooms, produce toxins;
- Other cases - where there is a reasonable suspicion that the health of bathers may be

seriously endangered; unexplained fish mortality in the area, although water quality indicators are in order; higher incidence of acute disease whose epidemiological characteristics indicate the bathing spot as a source of infection.

Small natural watercourses (streams) flowing from forested, erosion stabilized basins, excluding the possible contamination with sewage,are suitable to supply the small water reservoirs, used as swimming pools. Any possible pollution by erosion should be captured in either the upstream flat sedimentation reservoirs or such contaminated water bypass around recreational reservoirs. Settling reservoirs are shallow, flat, ground tanks, equipped with splitter device which ensures uniform flow in sedimentation tanks. It is advantageous to design a pair of sedimentation tanks, allowing alternating operation (sedimentation / clearing).
To increase the quality of water it is appropriate to use the cleaning effect of managed wetlands with horizontal surface or subsurface flow and an alternating sedimentation tanks.
At present, the use of aquaculture is significantly expanded to improve water quality and holding of nutrients.

Results
Recreational potential of the landscape and the swimming pool size

The adjusted indicator of recreational landscape potential with small water tanksR_R(Chroumal, 2000) recommends calculatingfrom the relationship

$$R_R = R_V . K_0 . K_J . K_T . K_P . K_A \quad \text{..... (1)}$$

WhereK_0, K_J, K_T, K_P, $K_A$are corrected coefficients of air quality, water quality, temperature, functionof tanks, attractiveness of the area

$$R_v = \left[\left(3L_n + 3L_{2t} + 1.5L_t + P_n + P_t \right) \frac{K_t}{F} \right] K_č \, K_{01} \, K_{02} \quad \text{..... (2)}$$

Where L_a is the length of the edges of water bodiesin the reservoirs, L_{2t} - the length of the edges of streams (width more than 8 m), L_t - flow length (width less than 8 m), P_a - the area of the reservoirs in the evaluated rectangle(%), P_t - area of the flow (%),K_t - climatic factor of efficiency, K_t = 0.1 A_d, A_d- the number of days of stay with an average daily temperature higher than 10 ° C, F - area of delineated territory, $K_č$- correction factor of water quality, K_{01}- correction factor of air qualityfrom terms of dust fallout, K_{02} - correction factor of air quality in terms of harmful gases.

Size of the swimming pool is proposed according to the size of settlement of the involved zone. It is recommended to considera zonewith 50 thousand of inhabitantsas the largest. N_k pool capacity is determined by the expected attendance, i.e. 10 to 30% of the involved zone:

N_k = O. x (people) …….. (3)

Where: N_k–capacity of swimming pool (people), O –number of inhabitants of the involved zone, x-visit rate coefficient 0,1 to 0,3
Necessary area of the swimming pool zone S_A (m^2) is calculated from

$S_A = N_k s_A$ …… (4)

Specific are of the swimming pool per 1 visitor s_A= 10 m^2

Total area of the swimming pool zone is dividedinto water area, including children's wading pool10%, settled areas 6%, roads and pavements 10%, recreational areas 40%, sport areas and sport fields 20%, children's playground 3%, vegetation (trees and bushes) 11%. Scheme of natural swimming pool division including necessary facilities is presented in Fig 1.
Necessary capacity of water area (N_v) is determined from swimming pool capacity and current stay of visitors in the water, size of water areaS_v

$N_V = N_k/a$ $S_V = N_v s_v$ (m^2) …… (5)

Where: a – coefficient of current stay in water (a=3 to 5), depends on the size of the involved zone, s_v – specific water area for recreation, s_v = 2.5 m^2 per 1 person.
Active water area is to awidth of water surface of 50m from the edge. Depth of water is different for swimmers, different for non-swimmers and children. Usually there are 20% volume of water depth 0.0 to 0.8 m, 40% volume of water depth 0.8 to1.3 m and 40% volume of water depth greater than 1.3 m. At the bottom there must not be any sudden changes in elevation, the bottom surface should be sandy or from small rounded river gravel without sharp stones and mixed clay. In case of larger slopes of banks or scrubby banks, access to water is provided by bridges or descending stairs or a floating pier.

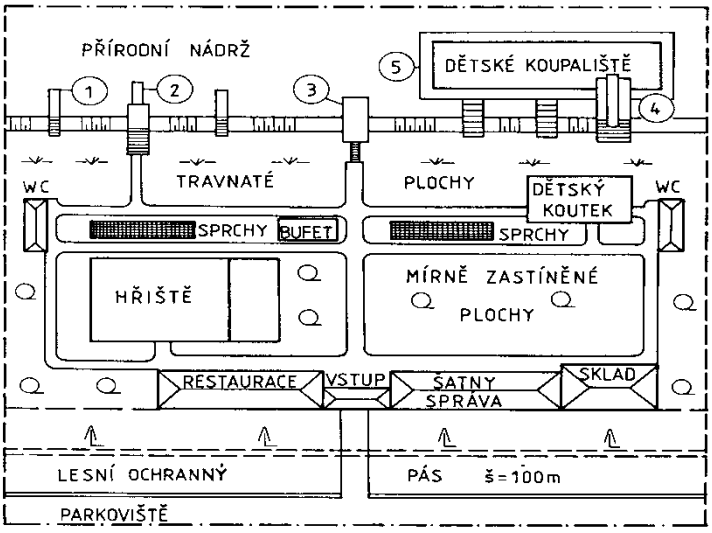

Fig. 1: Scheme of a natural swimming pool: 1-access to water, 2-spring board,3-lifeguard stand,4-water slide, 5-raft fencing

Layout and facilities of a recreation reservoir

It is necessary to protect the recreation reservoir against foreign water inflow by properly placed forest infiltration zones,interceptor ditches and canals, etc. Relax areaof the swimming pool area must be drained. An example of the arrangement of a natural swimming pool is illustrated in Figure 1 and 2. Natural swimming area is appropriate to be complemented, except the areas designated for sunbathing and sports, also by restaurants, changing rooms and the necessary facilities. Waste water from showers, toilets and sewage water from restaurant operations must be diverted to a sewage network under the recreational reservoir. Natural cleaning methodsare suitablefor wastewater treatment, such asvegetative reeds plants, ground filters and biological tanks with preliminary mechanical cleaning - small biological septic tanksin small reservoirs and classical mechanical cleaningin larger ones (screens, sand and grease traps, and sedimentation tanks). Details are given by Šálekand Tlapák (2006).
Details of the constructional layout of small water reservoirs, used for swimming (dams, take in and take out areas, reservoir area layout) areprovided by Šálek (2001), Šálek-Kujal-Doležal (1989), Tlapáket all. (2008).

Artificial swimming pools of small water reservoir character
Nowadays,swimming pools equippedwith natural wastewater treatment methods using aquacultureare more common. An example of a layout is demonstrated in Fig 3. These constructions form a transition between natural recreation reservoir and a swimming pool. Water management of these reservoirs forms a closed water cycle, only the water that evaporates, is drained or exceptionally soaks into the ground due to leakage is supplied.
The swimming pools of this type are sealed reservoirs, usually sealed with plastic sheeting, protected by geotextiles. Access to the reservoir is reinforced by natural, mostly agglutinated tiles from fine siliceous pebbles. In a similar manner, pavements and connecting paths are reinforced.

Fig 2: Small recreation swimming pool Pálava in Blansko

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Fig 3: A natural swimming pool with natural water treatment using aquaculture in Koválovice

Details of these swimming pools, including solution of water treatment using wetland vegetation and algae, are mentioned in a publication elaborated by many specialists (2008).

Issue of water rights concerning recreational water reservoirs

The issue water-rightslegislation is very extensive in relation to the use of reservoirs for recreational purposes. It involves mainly Act no. 254/2001 Coll.,on waters and amendment of certain laws (the Water Act), as amended, Act no. 183/2006 Coll.,on the land-use planning and Building Code (the Building Act), as amended (amended in 2013), Act no. 99/2004 Coll., on fishing, execution of fishing rights, fishing inspection, protection of marine fisheries resources and amending certain laws (Fisheries Act), Act no. 114/1992 Coll., on nature and landscapeprotection, as amended, Act no. 17/1992 Coll., on the natural environment, as amended, Act no. 344/1992 Coll., on agriculture land fund protection, as amended, Act no. 258/2000 Coll., on public health protection and on amending of certain related laws; Regulation no. 135/2004 Coll., laying down the health requirements for swimming pools and saunas; Directive of the European Parliament and Council 2000 / 60/ES of 23rd October 2000

establishing a framework for Community action in the field of water policy; Directive of the European Parliament and Council 2006/7/EC of 15th February 2006 concerning the management of bathing waters quality and repealing of Directive 76/150/EHS; Law No. 40/1964 Coll., the Civil Code.
The issue of water rights is based on the fact that these different legal standards, acts, decrees and directives dealwith small reservoirs as water bodies, but they define them in different ways, primarily with its complicated, proprietary legal determination. It is similar to the definition of the term "surface water" and the issue of dealing with them.
In the water law no. 254/2001 Coll., provision in Art. 55,paragraph 1,is important(quoting letter a):
Water bodies are constructions which serve to impoundment and retention of water, artificial regulation of runoff regime of surface water, protection and use of water,water management, protection against harmful effects of water, improvement of water conditions or for other purposes intended by this Act.
Act no. 114/1992 Coll.understands small reservoirsas important scenic elements (quoting):
Significant landscape element as an ecologically, geomorphologically or aesthetically valuable part of the landscape, shaping its typical appearance and contributing to its stability. Significant landscape features are forests, bogs, streams, ponds, lakes, floodplains.
Very significant, in relation to recreation usage of small reservoirs is provision included in Art. 3 par. 1 of Act no. 254/2001 Coll.:
Surface and underground waters are neither subject to ownership nor a part of the plot of land on which or under which they occur; rights to this water are regulated by Act no. 254/2001 Coll.
In relation to recreation usage of small water reservoirs it is possible to say that surface waters, used for recreation, cannot be considered in any case property related to property of a small reservoir. We can state that the character of surface waters, excluding general management with surface water, is a matter of public law.
However, lands neighbouring with small reservoirs which are owned by natural or legal persons have a completely different status and cannot be used for recreational purposes, without the consent of their owners.
Register of protected areas (further just Register) is in the Water Framework Directive (SR 2000/60/ES)defined in Articles 6 and 7 and in the related Appendix IV.
Article 6 of the Directive requires the Member States to establisha register or registers of all areas that were identified as areas requiring,in accordance with relevant Community legislation, special protection of surface and undergroundwater or retention of habitats and species directly depending on water in each catchment area. The register must include at least all of the territories listed in Annex IV of the Directive. Registers were completed by 22 December 2004.
The approach to Register throughout the Czech Republic area is derived from the above mentioned context, i.e.in all eight catchment area districts in accordance with Decree 292/2002 Coll. as amended by Decree 390/2004 Coll. TheRegister includes (or will include) the types of protected areas listed in Annex IV of the Directive, including areas designated as bathing areas under Act no. 254/2001 Coll. (§ 34) and Decree no. 159/2003 Coll. and all swimming pools in the wide open space, according to Act no. 258/2000 Coll. - In accordance with Annex IV, paragraph 1 of the Framework Directive, areas reserved as recreational waters and bathing water.
The third type of protected areas in accordance with Annex IV of the Directive are bodies of water designated as recreational waters including bathing areas according to Directive 76/160/EEC on quality of bathing waters.

The legislation, which is related to this type of territory in Community legislation, is the already mentioned Directive on bathing water quality.
No more rules that would define other types of recreational water use have been accepted.
Directive 76/160/EHSon the quality of bathing waters was transposed into Czech legislation byAct no. 254/2001 Coll. in Art. 34, and the actual bathing areas were defined by Decree no. 159/2003 Coll., bythe Ministry of Health and Ministry of theEnvironment which stipulates surface waters used for bathing. The Annex of this decree sets out a total of 128 bathing areas (sites)in the Czech Republic. With two exceptions, which are located in the zone of the Upper and Middle Elbe catchment area, all bathing areas are located in various types of reservoirs.
Besides bathing areas according to Directive 76/160/EHS, theCzech legislation – Act no. 258/2000 Coll., on the protection of public health - established and registered also so-called

swimming pools in the wide open space, which are natural water areas that are identified as suitable for bathing. Unlike bathing areas, they have their operator. The way of control of the quality of water in the bathing areas and swimming pools in the wide open spaceis defined by special legislation - Decree no. 464/2000 Coll., laying down the health requirements for swimming pools, sauna and health limits of outdoor playgrounds. From a technical point of view, theMinistry of Health and Ministry of the Environment and organisations managed by them provide definitions of bathing areas and swimming pools in the wide open space. Water Research Institute ofT.G. Masaryk is responsible for surveying of bathing areas and newlysurveying of swimming pools in the wide open space and their management in the public administration information system.
Locally relevant health stations are responsible for collecting data on water quality in bathing areas during the bathing season. National Health Institute and the Ministry of Health provide central data processing and storing data into the information system of the Ministry of Health – PiVo.
Bathing areas and swimming pools in the wide open space are determined as areas in reservoirs or streams, where swimming is carried out. Technically, the bathing placeat large-scale and complex reservoirs with more bathing places is a point in backwater of reservoir on the beach; in reservoirs with one swimming place it is the centre of the reservoir. In the case of bathing sites on streams the bathing place is the profile on the flow. The accuracy of location corresponds to the accuracy of water management maps 1: 50 000 and technical documents, which were availableat the time of processing.
The relation of bathing areas and swimming pools in the wide open space to the determined water areas of surface waters is not completely solved at present. The obscurities outlast concerning whether protected areas shall be identified with water bodies from the point of view of space and especially environmental objectives. As the determination of water bodies has not been finished, it would not be suitable to claim some of water areas as recreational, as demanded in Art. 1 of Appendix of IV Framework Directive.Bathing areas and swimming pools in the wide open areas will be meanwhile considered in Register as independent points and the relation to water bodies will be defined in the further stage of plan preparation of catchment area.

Conclusion

The presented article briefly speaks about the possibility of utilisation of small water reservoirs for recreation purposes. Authors mention fundamentals of right area election, quality water and environment requirements, special facilities and wastewater management. There is also a brief commentary about solution of artificial swimming pools, which are currently popular and many of them are being constructed. The report is supplemented by a list of basic acts with comments focused on the given issue.

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SPATIAL CHANGES OF THE AGRICULTURAL AND FORESTS LANDSCAPE IN SLOVAKIA IN 2008 – 2012 (PROCESSES IMPACTING PRACTICAL PROJECTS IN THE FIELD OF ENVIRONMENT PROTECTION)

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Abstract
This article deals with very important and actual topic as for the forming the landscape culture and that is the task of the spatial differentiation and changes of the agricultural and forests land(cover) in Slovakia and in the same way with connected processes which relate on the practical projects in the field of environment protection. Agricultural land and forests estates are one the main elements of the environment its semicultural land feature and they are also nature resource of each country. Its protection is therefore necessary and cadastral (Real estate Register) and other state institution dealing with agriculture and forests are inseparable part of this process. To the improvement of the land care helps property settlement of estates in the frame of their practical projects as well. One of them is f.e. land consolidation (LC), which are been practiced by the competence of each municipality and the territorial object of LC is extravilan (rural zone) of each cadastral territory. The whole duration of practical activities of LC is formed and fitted by the legislative documents of each country.

Keywords: agricultural land, forest estates, property settlement, land consolidation projects, spatial acreage changes

Introduction

An agricultural land and forests land (landscape) are one of the most important forms (features) of the environment, which creates an image of each anthropogenic and semi – cultural landscape.
These kinds of land are one of the natural resources of its national richness (wealth). That is a reason, why its protection is necessary and the institutions of cadastral (real estate register) and another state – institutions are incredible part of this process.
With the improvement of the landscape fund settlement helps also the process of land consolidation in each country included the ours (Slovakia). Its main role is the property settlement in practice and its influence on making practical projects of landscape environment protection.
The process of landscape consolidation is very important continual process itself. In the forming and beginning of this, the municipalities give to the persons in law (legal entities) offers in the frame of public procurement process. The winner of this will be then responsible and „able“ to create a rational form of property settlement and also rational spatial differentiation of each agricultural and forests landscape (mostly in the rural spaces of chosen cadastral territories), including proposal of its ecological arrangements.
The list of such legal entities is published on Ministry of Agriculture and rural development portal in Slovakia. The official spatial area of the land consolidation process are the whole of cadastral territories, if there is not determined another “ex lege” way. In practice, there is in Slovakia valid an „axiome“, that the object of land consolidation is mostly a rural space of chosen cadastral territories.
(the all types of the agricultural and forests land belong to the soil land reserves (PPF)).
Practical activities, which follow the announced process of land consolidation, are lead by the legislative platform, concretely Legal regulations by the act No. 330/1991 of Land consolidation and the act No. 162/1995 of real estate register (The Cadaster Law), then the act No. 220/2004 of agriculturalland protection and utilisation, the act No. 245/2003 of integral prevention and inundation (high flood) protection, act No. 326/2005 of the forests land in Slovakia and at last act No. 180/1995 of register reconditioned land registration (The ROEP Law).

The methodical and theoretical basis in the context of the spatial agriculture and forests landscape topic

This paper is focused on topic of continual spatial changes in the structure of land fund (we aimed to show to the agricultural and forests land mostly) and following processes as landscape

– ecological planning and on this depended institutional tool (appliance), one of them is here presented land consolidation in the Slovak condition context (and its importance into the practice).
The first step in our research was based on studies of many literature and materials sources in the field of strategical documents and planning from many model areas or case – studies.
We went through all in Slovakia valid and created legislative documents included the acts and each its implementation- regulations practices as f.e. announcements, another regulations, as well as consultations with experts as for land and cadastral law.
Our data was collected from the official data of Statistical Office of the Slovak republic and in the similar way from Geodesy, Cartography and Cadastre Authority of Slovak Republic if necessary (actual deadline was at 31.12.2012) and also from the portal of Slovak land fund and other regional portal which impact this state and features in individual (model) regions.
The gathered data and information we tried to put in some chosen system and form this way one special order, which could be able special structure of the landscape and its organisation scheme built on. We tried to enrich by us created system of gained data with some special way, so that we are ableto work with them further and make some results and outputs by the way of some tables and other special analysis.
In the beginning of our analysis, we start to state out our hypothesis, which we want to affirm (approve), or on the other hand to neglect.
In the conclusion we tried to make some result from our research by a logical assortment, so that our outputs would be in the intention of concrete phenomenon running in the landscape (country), at the same time with estimating of some principles and entities and which could give a sense of a characteristics features in the Slovak condition.

The results of spatial changes analysis of estate – sorts of an agricultural (arable) and forests land fund in Slovakia
On the basis of a long – termed research and work in practical projects in the frame of some institution working in practice and in cooperation with them, we make a statement = hypothesis, that:

- In Slovakia there is a clear sensible tendencyof an agricultural land (predominantly) arable land decrease, mostly in behalf of the built – up areas and „rest“areas.
- In the same way we can make a statement about the stagnation or little increase of the spatial acreage of forests land.

Total spatial changes (total amounts) in all estate – sorts belonging to agricultural fund in the last 4 – 5 years are caused of several these reasons:

1. In the reason of spatial agricultural land (included mostly arable one) and forests land acreages, but they may be caused by the area – changes and movements of cadastral territories also which could be caused by changes in an administrative apparatus as well.
2. By exact measures of a cadastral apparatus renewal in the frame of § 8 valid Cadastral Act (Act No. 162/1995) after new mapping processes (newCartographical mapping in the cooperation and in sense of the § 69 announcement of the Cadastral Act), and also changes of wrong acreage amounts reparations finding out with the new cadastral apparatus creation (administration).
3. **The changes of continual permanent lasting character, which have the main and dominant impact on the landscape forming and they are a target of our research mostly.**

Markers (indicators) of absolute or relative estates - acreages which belong to the system of agricultural and forests land classification, are in the practice itself different. The marker of agricultural land acreage/per 1 inhabitant f.e. may be very unexact and orientation – aimed. The reason why, could be the fact, that this marker reflects also the number of inhabitants, their growth or increase.
The prevailing measurement can we view by several simple markers f.e. absolute decreases of agricultural estates (arable estates) per last years. We confirm this fact by the example of some statistical dates. In the year 2008 decreases the total acreage of an agricultural land **(AL)**less 5 524 ha (within the scope an arable land **(ARL)**decrease of 4 880 ha). In the year 2011 decreases the AL less of 3 479 ha (within of 980 ha ARL). The forest land(**FL)**in the opposite to this fact increases total in year 2011 of 1 086 ha (in every tree categories AL, ARL, FL), whereby the main changes were in 3. category of continual permanent lasting character. This

kind of medium - term tendency shows predominantly on definite bad - marks of total agricultural land resources amount and its slow disappearance each year.In the last category, we can see some trend of stabilisation of this mentioned process. The detail analysis and detection of this trends is important, because this kind of land development seems to be a special process, which tends to have general tendency in the Middle Europe. The problem of rapid decrease of some land - sorts could lead to several problems in the field of agricultural production and self - supplience and other important economical problems, not still talking about ever-lasting changes of landcover each impacted country.
In Slovak condition it seems to be positive phenomenon one like in 2008 it increasesthe total amount acreage of forest landcover of 883 ha forest estates and in 2011 of 1256 ha forest estates which are in official evidence. This positive fact can be a result of continual process of land consolidation as well.
The upper mentioned marker of each country land - scape belongs also indicator of forest (agriculture,arable)land acreage area/one inhabitant which is relevant only like one important feature of means life-space, but also about the possibility and ability of the region/state itself to supply oneself. It is calculated on the similar principle as f.e. an indicator of Ecological Footprint, which alsodisposesome international U.N.O and EU classifications with.
In Slovakia there is the last found-out state of this marker from the end of 2011 and the details shows us the Table 1.

Tab. 1: Acreage of an agricultural land (including of an arable land) per inhabitant in Slovakia (regions in hectars)

Region in Slovakia	**Agricultural land per 1 inhabitant in hectars (ha)**	**Arable land per 1 inhabitant in hectars**	**Total number of inhabitants to 31.12.2011**
Bratislavský	0,1451	0,1149	634 862
Trnavský	0,5129	0,4602	564 953
Trenčiansky	0,3075	0,1630	598 614
Nitriansky	0,6635	0,5763	704 222
Žilinský	0,3500	0,0870	699 624
Banskobystrický	0,6366	0,2542	651 428
Prešovský	0,4707	0,1831	811 589
Košický	0,4297	0,2612	781 944
Total in Slovakia	**0,4426**	**0,2599**	**5 447 236**

Source: Statistical yearbook of Slovak land fund, 2011, actual private calculation, december 2012

Tab. 2: Trend of the agricultural and forest land sorts in Slovakia from 2004 - 2012 (in hectars)

year	**ARL**	**hop-fields**	**vineyards**	**gardens**	**Fruit groves**	**grass land**	**AL total**	**FL total**	**difference** (total area of SR - ALF)	**Total area of Slovakia**
2004	**1 430 197**	**560**	**27 313**	**77 351**	**17 952**	**883 506**	**2 436 879**	**2 004 100**	**462 421**	**4 903 400**
2005	1 430 594	561	27 341	77 287	17 912	881 054	2 434 749	2 004 927	463 724	4 903 400
2006	1 429 040	538	27 307	76 865	17 947	881 283	2 432 979	2 005 234	465 187	4 903 400
2007	1 427 357	534	27 314	76 813	17 792	880 873	2 430 683	2 006 939	465 778	4 903 400
2008	**1 425 896**	**530**	**27 243**	**76 720**	**17 590**	**880 920**	**2 428 899**	**2 007 142**	**467 532**	**4 903 573**
2009	1 421 852	520	27 258	76 636	17 360	879 853	2 423 478	2 008 257	471 969	4 903 704
2010	1 417 983	519	27 140	76 563	17 257	878 470	2 417 933	2 008 843	476 864	4 903 640
2011	1 416 633	520	27 091	76 529	17 034	876 484	2 414 291	2 011 250	478 103	4 903 644
2012	**1 415 653**	**517**	**26 997**	**76 563**	**16 858**	**874 224**	**2 410 812**	**2 012 336**	**480 465**	**4 903 613**

Source: Statistical yearbook of Slovak land fund, 2008 - 2012, http://portal.statistics.sk/, completed by actual private calculation, 2013

As a matter of official evidence changes of AL and FL (table 2 and 3), we can make a conclusion, that the total amount acreage of ARL has decreased in 8 last years 2012/2008 of 14 544 ha and the total amount acreage of AL has decreased of 26 067 ha. These decreases was caused mainly in behalf of built-up estates (which belong to the continual - lasting changes), but little anomalies may be caused by territory-changes in general and also after exact measures connected with the new-mapping by the renewal in the new cadastral apparatus (Geodesy, Cartography and Cadastre Authority of Slovak Republic, 2012).
In the opposite of up-mentioned fact, the acreage in Slovakia of forest land estates in last 8 years has increased. In 2008→2012 has increased an acreage of forest land in 8 236 ha (table 2, 3). Some investors or in region potential interesting groups, make some chosen analysis which determine specific features of each region (area) also, or they map the situation in chosen area with own marketing-strategies.
The best recognizabletendency in Slovakia as we mentioned up, is a well-marked decrease of each estate-sortswhich belong to the agricultural fund **(AF).**As a good comparison we can notice, that total AF acreage in Slovakia formed 49,53 % (percentof total area) in 2008, in year 2009 = 49,42 % and in 2012 49,16%. In opposite the total Forest Fund **(FF)**acreage in Slovakia formed 40,93 % in 2008, then in 2009 = 40,95 % and in 2012 = 41,04%, which means anyway a little increase of forest land pro rate, but also absolute values of forest land cover in Slovakia (tables 1 -3).

Tab. 3: Trend of the total amounts changes of land types in Slovakia from 2008 – 2012 (in hectars)

estate-sort	Acreage of estate-sorts until 31.12.2008	Acreage of estate-sorts until 31.12.2009	Acreage of estate-sorts until 1.1.2011	Acreage of estate-sorts until 1.1.2012	Discounted value of estate-sorts acreagein 2012 – 2008	Index of increase/decrease 2012/2004 (2012/2008)
						coefficientin %
Arable land total	1 425 896	1 421 582,00	**1 416 633**	**1 415 653**	**-10 243**	**98,98**
hop-fields	530	520,00	520	517	-13	92,35
vineyards	27 243	27 258,00	27 091	26 997	-246	98,84
gardens	76 720	76 636,00	76 529	76 563	-157	98,98
Fruit groves	17 590	17 360,00	17 034	16 858	-732	93,90
grassland	880 920	879 853,00	876 484	874 224	-6 696	98,95
Agricultural land total	2 428 899	2 423 478,00	**2 414 291**	**2 410 812**	**-18 087**	**98,93**
Forest land total	2 007 142	2 008 257,00	**2 011 250**	**2 012 336**	**5 194**	**100,4**
Water areas	93 656	94 575,00	94 761	94 764	1 108	101,1
built-up areas	227 931	229 059,00	230 589	231 967	4 036	101,7
Other fields	145 945	148 335,00	152 753	153 733	7 788	105,3
non-agricultural estates and non-forest estates total	467 532	471 969,00	**478 103**	**480 465**	**12 933**	**102,8**
Total acreage of each estates in Slovakia	**4 903 573**	**4 903 704,00**	**4 903 644**	**4 903 613**	**40**	**100,0**

Source :Statistical yearbook of Slovak land fund, 2012, http://portal.statistics.sk/, completed by actual private calculation, 2013

Processes relying on practical projects in the field of environment protection in the context of their importance for land-consolidation in Slovakia

One of the basis condition of non-repayable financial contribution serving from Structural funds is the condition of property settlement of estates, which should be space subjects of served projects. This statement is valid as for every Operational programme (f.e. Environmental Operational programme), the Cohasion Fund and other grant-schemes relevant for Slovak republic (cross-border cooperation pragrammes, international initiativesLIFE +, INTERREG IVC, but also on the national level as Envirofund, Recycling fund, Rural Development Programme, Village Recovery Programme, Leader initiative and Local Action Groups in municipalities etc. This is the main reason why we consider this aspect of property settlement of estates in individual cadastral territories (municipalities) and its correct official evidence as one of the important basic attributes in landscape-ecological planning and regional development.

In the international initiatives, like are f.e. LIFE and INERREG, there is very important condition of project approval the task of making projects on property ownership settled estates in preference. In Regional Operational Programme (ROP), or Environmental operational Programme (EOP), there is this mentioned task even the basis condition of non-repayable financial contribution serving in the frame of actual calls of proposals at all. These conditions could be fulfilled in Slovakia except to the individual subjects - endeavours predominantly by the land consolidation appliance.

The results analysis as for the land proprietary settlement, and each its sort - estates are aiming to the fact , that most of the AL included ARL is owned by private sector (mainly personal entities) → this causes a great disintegration and land fragmentation and so more easier official estates give over to the non-agricultural land sector by law.

Tab. 4: The ownership of estate sorts (types) in Slovakia in 2012 (in hectars)

kind of ownership	ARL	grassland	ALtotal	FL total	Water areas (surfaces)	Built - up areas	Other fields	Total acreage
State owners	1 506	712	2 395	2 165	24 120	6 450	6 901	**42 031**
municipalities	6 927	6 505	15 104	76 617	2 022	25 577	17 330	**136 649**
Regional municipatities	85	30	192	5	7	3 779	537	**4 519**
church	20 439	4 621	26 677	41 363	283	1 681	1 752	**71 755**
Private bodies	107 647	54 095	231 052	138 328	4 627	68 767	13 968	**456 743**
Corporate bodies	15 480	6 397	23 567	48 975	910	29 403	18 754	**121 609**
Slovak land fund (SPF)	7 551	6 978	15 160	4 520	652	1 695	1 317	**23 344**
Forest of Slovak republic + TANAP	280	2 852	3 215	426 860	708	858	1 323	**432 964**
Unknown proprietors + participants in process	1 255 737	792 033	2 093 450	1 273 504	61 436	93 758	91 851	**3 613 998**
Total in Slovakia	**1 415 653**	**874 224**	**2 410 812**	**2 012 336**	**94 764**	**231 967**	**153 733**	**4 903 613**

Source :Statistical yearbook of Slovak land fund, 2012, archives internal information, 2012, http://portal.statistics.sk/, completed by actual private calculation, 2013

In forest land sector there is the situation quite another one, which is the reason of fact, that the total acreage of forest land is in last years stabilised even a bit increased. The biggest owner of forests land in Slovakia is a state organisation State enterprise Forests of the Slovak Republic BanskáBystricaand further an organisation State Forests of TANAP. Only then follow personal or corporate - entitiesmostly by the body - law forms f.e. common estates - ownership or forest landowners association and the proportional share of such hold - estates increases every time. Similarly it increases also the proportional share of forest - estates owned by

corporate - bodies "de iure" in between belong different non - profit associations or environment - protection partnerships.
This non - profit associations has been trying through the way of project calls of proposal to purchase forest estates or even their parts which dispose of some special or exclusive ecosystems or ecosystem - functions, for the purpose of nature - conservation of special nature wild parts and biodiversity - protection.
A big forests acreage enough are owned by municipalities (3,8 % of forest – estates in Slovakia) and also 2,05 % of forest - estates are still owned by church (Table 4).
Statistically a great amount of forest estate are nowadays in several acts and official operation (with another words in administrative and law - actions, see also the last but one line in Table 4). As a reason of this fact there is not possible to anticipate or predict exactly the solution of forest - owners to the future after closing all now - running changes in this land (cadastral) process.

The situation of property settlement in Slovakia has been already improved in last 5 years. Despite of this statement there are still areas and cadastral territories **(c.t.)**which have no vectorial - cadastral maps created**(CD map**). On such areas there are very week map - basic documents on the level of old land estates - maps, often in onlyanalog form in archives - registries. In many cadastral territories there are not even finished the Registers of estates evidence renewal **(ROEP),** nor the Land consolidations**(LC).**
In Slovakia there can be the situation as for property settlement from practical point of view different (conclusions from private research and terrain - practice, 2008 - 2012):

1. Many items and reports about estates (include property or rights of use or disposal law) are still only in the Domesday books (they are archivated in each cadaster office) (The act No. 162/1995 Z.z., §8, art. 4), which may caused problems in those cadastral territories, where the process of ROEP is not finished yet. If ROEP in some c.t. is finished and administratively = officially registered, every parcel gets its parcels number in the cadastral "E" apparatus and could be inscriptioned and reported on property list. The contradiction between the contemporary state in agricultural and forests rural land relies on the fact, that from 1 825 ths. plots, only 93 ths has its own property list.
2. Many those parcels (from the point 1. up) which are in evidence "E" of cadastral apparatus, they can be used for many further legal law - acts, but there are necessary new geometrical plans or new mapping to be created. These examples of estates maybe showed as good basic work - documentfor the LC preparing process.
3. In some c.t. in which corporate entities and state enterprises have estates in state administration of assets by course of law No. 278/1993 Z.z. about state administration of assets in later years **(lyar)**according to rules (lyar), must be created geometrical plans (GP) againand many estates will get their new parcel - numbers and only then they can be register on the property list in "C" register in official cadastral apparatus.
4. In some c.t. in which had be land consolidation closed yet and officially registered, the result of this LC process is obligatory by official Act (§ 14 of the ActNo. 330/1991 Zb. about land consolidation (lyar) and it is published with public advertisement and after this all can be registered in cadastral apparatus in "C" register. Against this official act can not be further appealed, only with discretionary remedies in special judgement process.

(Conclusions from private and terrain research, 2011, 2012).

In the frame of LC process, there is one important integral part and feature: the land - assembling and new proposal of space - differentiation of each estates is reflected in real practice as de facto state and "de iure" state of parcels in particular area (territory) is becoming identical. Only then we can make a statement, that the estates are property settled, what is very important as a feedback to the financial contribution serving process and at last for forming of special landscape - structure itself.
The aspect (state) of property settlement of estates in Slovakia we can conclude into some classes of these important factors:

- From the value (praise) of estates in market and from its commercial value,
- From the amount of owners (proprietors) → from the amount of property lists,
- From the way and allowance of the original property inscription, f.e. in domesday-book, or other archival documents,

- From the geographical features of each local area and plots and connections of these factors related to the property settlement - aspects,
- From the complexity and complications of other administrational - necessities (burdens, notifications by the property lists, the basis ground documents in registry of deeds, etc.,
- From the compromise and agreements of each proprietors (explicitly a human factor),
- From the political and legislative attributes of each individual system in relevant country and development priorities and on the other hand this fact relies on as a feedback to the regional development possibilities in the region,
- From the further continuation and progression of the qualitative growth of the landscape - ecological appliance = land consolidation

(Conclusions from private and terrain research, 2012).

Nowadays, there is a tendency in many towns, but also bigger villages (municipalities) each free area to buit-in and cover by some buildings. Therefore here occurs one big dilemma and conflict of interests, if there is more important for the regional development a social and economical addition of region, or natural heritage protection and which level to. As a matter of this fact,some brown fields areas or green areas which are growing many industrial and commercial centres on, are on the agricultural lands (mostly even on arable land) and it is necessary to extract (discommon) such plots from the AF or FF, what may be a result of this operation not only less AL in general, but also secondary may the landscape structure rapidly change and also changes its fragmentation and diversity.

Seeing that by means of the spatial units relations are consequently creating higher spatial units -regions (Džambazovič, 2007), the spatial decisions and judgements may have medium - termed as much as long - termed impact on the spatial landscape structure of regions.

The rate of plots - disintegration has come to such a state, that the fraction which is expresses co-ownership part with, is very heavy rationally to understand and really non-imaginable. For this reason the value for dispose of with so fragmented plots has on the property estate - market no sense. This intolerable state tries to be solved by the Act No. 180/1995 of some arrangements about property settlements of plots in the last years (the Act of ROEP). It postulates some arrangements against plots - fragmentation in cadaster - rural areas. The main rule is the fact, that in these areas could not be formed smaller plot - size that 2000 m^2 as for an agricultural estate and smaller plot - size that 5000 m^2 as fora forest estate (Štefanovič, 2004).

The contradiction between the contemporary state in agricultural and forests rural land relies on the fact, that from 1 825 ths. plots, only 93 ths has its own property list and exactly this one should be solved by land consolidation process (ÚGKaK SR, 2009, www.katasterportal.sk, 2012).In 1991 was in Slovakia passed the Law No. 330/1991 about the land consolidation, property settlement, land register - offices, land - fund and common estate - ownerships (The Act of LC). The main content and function of this Act was to ensure the process of consolidation, split, re-placement and spatial configuration of estates on the ground of valid and existing property relations and to propose new terrain, transfer, water-management, recultivation and reclaimable arrangements (Košičiarová et al., 2002).

Along with these processes should be also ecological arrangements in terrain rebuilt-in, which have a main purpose to rationalise the agricultural circumstances and to ensure a sustainable visual appearance of Slovak rural landscape. It would be good, if this theory could be in harmony with “good practices” arrangement in common use also.

The positive fact we can mention, that this process is running with the cooperation and participation of inhabitants in each relevant municipality and also with participation of experts working in this sphere. The project of LC itself contains the proposal of new spatial land differentiation with these incorporated principles:

- ✓ Public and common equipment plans,
- ✓ Location and emplacement of alternative subsidiary plots and their allocation to new owners and at the same time a list of compensation in money (or another financial property) = proportional allocation plan,
- ✓ **The local territorial system of ecological stability (TSES) in division of LC.**

Although the main condition of LC process still remains the task of property settlement of estate in chosen territory, it is a great pity, that the second, but the same important role of this process still stays often too be forgotten. That should be the role of creating the landscape structure and the influence of LC on the country itself.

The process of LC is very difficult and long-termed, because it involves itself first:

- The identification and reambulation of the basis documents from the relevant territory,
- Solution and proposal of submitted or new- proposed property - relations,
- The new mapping process and detection of any changes in space between reality in terrain and cadastral or older basis maps,
- The results of LC have an influence on the cadastral register (Real Estate Register), because they establish, change or neglect the proprietorships to the estates and these detail inscriptions have an impact to better understanding of LC decision and on the other hand as a feedback to better operations connected with human decisions and activities in real space.

The ways how to solve and propose ecological arrangements in the landscape in the frame of land consolidation process

In the intentions of property relations, their cartographical visualisation and consequential practical realisations of LC in the relation to environment protection, it is important to elevate and appreciate these main functions of LC:

- ✓ The protection and elevation of the water surfaces function and their protective zones,
- ✓ The function of wetland ecosystems,
- ✓ The function of wealthy - species forest ecosystems, the forest steppe ecosystems with the special emphasis on the countryside as one integral system in general,
- ✓ Other rare valuable ecosystems, or their parts, where are existing special rare and protected species of plants or animals.

The estates under these important and exclusive areas creates one of the special part of land - law research. They are called as estates under protection -areas and their relation to the environment protection is great because of the principle, that the ecological wealth resources “belongs to all people” in the country and they have a great value = importance of public interest (utility). The term of public utilisation in this paper we understand not only as an explanation of law-term (public buildings, public services, technical equipment facilities), but also predominantly as a general term of public appreciation and utilisation of those parts of our land, which include natural, wild and other ecological uncommon, valuable or precious ecosystems, which our legislative platform nowhere enumerates.

To those belong f.e. biocentres and biocorridorsand interactive components. The utilization of such estates by law is similar as abandoned property (or abeyance estates).Those, which were situated in rural space, passed through the law to the state ownership of Slovak republic, with the direction of special administration assests - acts. Those ones, which stayed in town (municipality) residential areas, were passed through into the municipality - ownerships.

The same way, new created parcels on such special spaces, which have been in evidence of Slovak republic ownership, are in administration assests of the Slovak land fund institution**(SPF).** Interactive components in the landscape are still the object of re-parcelation and are at the same way one of the most important local arrangements in the frame of LC in Slovak rural region. These components should have protective and stability character. The most important feature and their importance is anti- erosive protection, which is not sufficient especially in rural areas and by agricultural land areas of bigger acreages. If this important fact an attribute of LC planning would been not imported into the real practical arrangements, it may lead to the devaluation, even devastation or degradation of many acreages of arableland. This negative state can be eliminated by arrangements in the frame of LC as follows:

- ❖ With the correct spatial organisation and differentiation of the land fund,
- ❖ With the exact location and emplacing of agricultural cultivations,
- ❖ With the correct size and the correct shape of parcels,
- ❖ With building new anti-erosive infiltrative absorbing drainage lines,
- ❖ With building new protection grass-plots,
- ❖ With the wood - utilisation (ground wood species or tree species) as a protection tool against water erosion.

In the frame of territorial system of ecological stability(TSES) it is important at first the chosen area to extract to the common LC process and second choose those estates, which seem to be as ecologically stabilised.

If there in some cadastral territory TSES doesn’t exist, this situation is being solved in practice individual in the frame of preparation - procedures suggestions and further along with

preparation of LC project itself. For areas with bigger % proportion of arable land cultures, there is typical feature of stable structures deficiency. In these local areas there used to be the only stabile land feature structure only coast - vegetation and alluvial biocoenosis with prevailing function of biocorridors. The role of the LC project engineer is very so very difficult one.
As a matter of this fact, we can conclude, that only the total acreage of an agricultural land in not an uniform positive indicator of sustainable development. In some cases it could be even contrastive element in the point of view of the richness, biodiversity, fragmentation in each countryside against its uniformity as an important task how to resist to external effects (private terrain research, 2011, 2012).
Further important step as for the issue of territorial landscape protection is also the law and system - protection, f.e. the possibility to purchase. In Slovakia there can be noticeable some positive step in this field only in the last 3 - 4 years, even this law - possibility hasn't been working yet, although the Act No. 543/2002 about nature and landscape protection is valid from the year 2002 yet and it contains itself also concrete apparatus, how to advance in this task in protected areas with the 3, 4 or 5 degree of protection and also contains the arguement, that the state Slovak republic has to such protected area right of first refusal.This kind of law - possibility is on the other hand very complicated in practice.
The care protection areas in Slovakia is insured very differently by many land - protection institutions and organisation, then by private owners and renters, by municipalities or non-government agencies. The transposition of European Union Law by accepting of some European Commission (EC) directions was only the

- ✓ first step in the law - approximation.
- ✓ The second one is (would be) replacement of personal authorities and the improvement of institutional level to put the environmental law into the effect: second step: law - implementation.
- ✓ Finally the third step is to arrange how to follow and respect the law even if through the way of controls and sanctions: law - enforcement (Košičiarová et al., 2002).

Discussion and conclusion
We tried to focus on one negative phenomenon in our country and this is the completion decrease of an agricultural land fund in general. The most often proved factors of this decrease is caused mostly by:

1. Line - buildings of the huge area and with great acreage at all (f.e. highways, motorways, other roads and paths etc.);
2. Big acreages of arable land under new logistical industrial parks;
3. Car parking - places as one of the contemporary trends in town and their suburbs, caused by continual lasting process of the huge amount of vehicles (not always is the car building places at the expense of an arable land, but mainly of green places in town, town - parks, or residual areas, which may be become greens, or other non - used areas with no function, which there was not considered carefully better utilization);
4. Polyfunctional objects with the market and business function dominance (include mainly objects of the tertiary and quaternary sectors, thus the objects of advocacy or notary services, bank, insurance companies, estate - agencies etc.). To this forth point we must observe, that necessity of such objects is for considering the consequences, because, there is lot of such objects in almost the whole Slovak not only city yet) space. The huge amount of this polyfunctional objects has become in face of the confrontation with other possible functional utilization overcrowded (overequipped)

(synthesis of own private research conclusion, 2010 - 2012).
On the ground of last obtained data analysis and the consequent private research, we managed to affirm our hypothesis, that in the last 5 - 8 years, there is a marked continuous lasting decrease of an agricultural land (all of its sorts, mostly arable land however), whereby in last 2 years is a tendency of mild decline of this decrease. In the opposite to this fact, thanks to the some positive legislative arrangements and some non - government groups involvement, we were successful in arresting of forest land decrease (which was mostly noticeable in last 3 decades) and it comes into being a stagnation of forest land acreage, actually a slow gently increase in Slovak space condition. The second main persisting tendency are non- settled property conditions in the land - law(Ministry of agriculture and ruraldevelopment, 2011).
We can further make a conclusion, that the landscape structure and land - utilization are not only important indicators of the development and balancein each country, but also an approximate view of actual legislative and political changes, running in the country itself

in space and time. After the right analysis and then synthesis of chosen data, we can obtain a quite detail overview of landscape - situation and balance, which is an important input for further correct decisions in country (rational landscape management, f.e. in the frame of LC process) (Muchová, Petrovič, 2010).
In the intentions of these conclusions and solution - proposals, it is necessary to put an accent on the "green growth" in the whole agricultural and forests sector, with practical (not only theoretical) provisions making of environmental aspects. These processes and phenomenon up noticed in our paper, have a great influence and practical effect on the concrete projects creating in space. It would be desirable, if we could join these special environmental arrangements with the applied research - progress in this field and interconnect this with landscape ecological planning practice and country image creating. This we see as one of the possibility of catching the negative features in the landscape and propose (provide) a correct rational utilization potential in model space - areas.

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SPORTING AND RECREATIONAL FUNCTIONS OF WATER STREAMS

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Abstract
Because of the multiple benefits to riverfront communities, whitewater courses have been popping up in cities all around the world. Courses bring a major positive impact on a community's quality of life by creation new family-oriented recreation opportunities for people who enjoy the outdoors activities. Whitewater courses attract river for more people, have a positive impact on environmental and recreational purposes, provide an exciting controlled learning environment for kids and adults and increase the economy. In paper basic principles of whitewater courses designing as well as selected whitewater courses in the world and in the Slovakia with the outlooks are presented.

Key words: whitewater, pumping system, obstacles

Introduction

Whitewater stadiums are facilities which permit the practice of whitewater sports (canoe, kayak, whitewater swimming, rafting, tubbing, hot dog…) within an organized and secured frame. These projects go with the development of out-door sports in an urban environment. Whitewater stadiums bring whitewater into city and they are real attraction centres [1], [2].
Designing of whitewater courses is connected with Olympics games, because water slalom belongs among Olympic disciplines. Whitewater course is artificial canal where the obstacles are placed for the purpose of suitable rapid conditions for water sports (water slalom, rafting, freestyle…) and for anchoring gates. Construction of these courses is exacting for design, realisation and management. The grade reflects the technical difficulty and skill level required associated with the section of river. Whitewater canals are classified as competitive or training according to its construction parameters [3].

Classification of whitewater

The most widely used grading system is the *International Scale of River Difficulty*, where whitewater (either an individual rapid or the entire river) is classed in six categories. The grade reflects both the technical difficulty and the danger associated with a rapid, with grade I referring to flat or slow moving water with few hazards, and grade VI referring to the hardest rapids which are very dangerous even for expert paddlers [4].
A rapid's grade is not fixed, since it may vary greatly depending on the water depth and speed of flow. Although some rapids may be easier at high flows because features are covered or "washed-out," high water usually makes rapids more difficult and dangerous. At flood stage, even rapids which are usually easy can contain lethal and unpredictable hazards [5].

Whitewater courses design

Water stream regulation project is based on purpose of usage the stream and the final water stream effectiveness. Before the water stream regulation starts, implementation of related groundwork and land surveys has to be done. For land survey we understands surveying natural, technical, economical, Urban and architectonical aspects of project [6]. For designing riverbed optimization project these facts has to be determined [7]:

- ✓ Basic morphologic characteristics of water stream
- ✓ Basic hydrological data of assessed water stream

All surveys need to be merged effectively and previously realized surveys should be utilized greatly. Survey is to be based on range commeasuring size and significance of building project [6]. It contains geodetical elaborate, hydrological data, geological and hydrogeological data, pedological survey, biological survey and economical elaborate.
By means of in situ terrain works river bank situation, inundation area, cause and extent of floods and the range of damage caused by floods. Extent and manners of adjustments is to be pictured in roughly edges as well as basic morphometrical new water stream characteristics [7].

Materials, which needed to be taken into consideration in Slovakia, are described in STN 75 2102 Rivers and brooks regulations [8].
Proposition for designing course approved for international race meetings, training purposes or water sports as well as consideration of group of sportsmen and safety standards have to be full filled. Obstacles have to be placed suitably, widen of riverbed have to be in proper parts and right position and height of drops is also necessary. That is why designing of whitewater course is task for team of engineers as well as for experienced sportsmen who have a clear understanding of rules.
Recommendations for whitewater courses design parameters are [3]:

- Course length - minimal length for official and Olympic water slalom races is 300m.
- Cross section - simple shapes should be used (trapezoid or U-shaped).
- Cross section width - needs to be designed from 10 to 12 m but not less as 7 m which is double the size of slalom kayak.
- Water depth – no less than 0.4 m must be provided for safe swimming. Average depth of 0.75 – 0.9 m is optimal for Eskimo roll and to cut edges under the water. For Freestyle kayak, depth of 1.5 meters must be allowed.
- Velocity – for beginners velocity from 1.4 to 1.7 $m.s^{-1}$ is recommended. For professionals 2 $m.s^{-1}$ is the average. Rapids with higher velocity are allowed.
- Roughness – roughness of the surface should be minimal for safety and rapid boat wearing off. Material of construction is preferably concrete with smooth surface finish.

Requirements of International Canoe Federation (ICF) related to length, depth width and other parameters are shown in Table 1 [9].

Tab. 1: ICF Olympic Standard Projects requirements

Parameter	Magnitude
length l (m)	250
width b (m)	7
depth y (m)	1.2
discharge Q (m3.s-1)	14
gradient H (m)	5

Although these parameters should be taken into consideration when designing process is underway these are not fix rules. There are cases when real conditions interfere with ICF (International Canoe Federation) parameters, for example Trnávka in Czech Republic, which is situated right under the dam wall or when courses have to maintain their natural character.
Depending on where the course is planned to build, different water supply systems are designing. Among them gravity system (when source of supply is at sufficient height), pumping system (water distribution from lower to higher areas using pump stations placed in whitewater course), tidal system (based on maintaining water during high tide using movable dam) and combined gravity and pumping system [2].

Whitewater Courses in the World
History of the modern whitewater courses started in Augsburg (Germany) in 1972, where the first artificial whitewater course on the so called Eiskanal was created for the slalom canoeing in the Olympic Games in Munich. Its parameters are suitable for the international competitions and championships until today. The next Olympic whitewater course was built in 1992 for the Olympic Games in Barcelona, when it was included back into the olympic disciplines after a 20 year break [10].

The Cardiff international whitewater in United Kingdom
In Fig. 1 [11] The Cardiff International Whitewater centre as the first on demand whitewater rafting facility in the UK is illustrated. The facility was designed by French company, HydroStadium, who designed similar courses for the Sydney, Athens and Beijing Olympics.
In November 2008, a 180-tonne crane was constructed on the site in order to start work on a temporary dam that held back the water while four large pumps were installed. The facility could be used for some of the 2012 London Olympics events, and 50,000 people are also expected to use it each year.

Fig. 1: The Cardiff International Whitewater centre

The 250 metre hairpin-shaped course (Fig. 1) can hold up to 16 m^3 of water per second when being used for full international competitions but for recreational use it will generally hold only 8 $m^3.s^{-1}$ [11].

The Tacen Whitewater Course in Ljubjana in Slovenia

This whitewater course is a venue for canoe and kayak slalom competition in Tacen, Slovenia, a suburb of Ljubljana. Located on the Sava River, 8 km northwest of the city centre, it is known locally as KKK Tacen (Kajak Kanu Klub Tacen) and is shown in Fig. 2 [12].

Fig. 2: The Tacen Whitewater Course in Slovenia

The course played an important role in development of the sport during the past six decades. In 1939, when its first competition was held, it was a natural rapid at the base of a dam in the Sava River. After many upgrades, in 1990 it was given a concrete channel and the features of a modern Olympic-style slalom course. Tacen hosts a major international competition almost every year, examples being the 2008 International Canoe Federation (ICF) Slalom World Cup and the 1991 and 2010 World Championships [11].

Lannion whitewater stadium in France

Whitewater is situated in the town centre of Lannion and water is supplied to whitewater course by combination of tidal and gravity system.

A mobile dam at the beginning of the course allows to stock water during the rising tide and to release this reserve during the ebb tide (Fig. 3) [13]. The town of Lannion organizes initiation sessions for beginners, international races and also discovery excursions for school children [2].

Fig. 3: Lannion whitewater stadium

The use of the tide is possible thanks to two gates commanded by a programmed automaton which is a technical innovation [13].

Whitewater Courses in Slovakia

After the success of Slovak sportsmen in whitewater disciplines the interest in the whitewater course building is rising in Slovakia. In present, only 2 whitewater areas which meet the requirements for international championship organize – Čuňovo and Liptovský Mikuláš.

Water sport centre Čuňovo

The Centre's facilities and conception meet the criteria of world's best sports stadiums. The Water Sports Centre Čunovo is an artificial whitewater slalom course in Slovakia, on an island in the Danube river, 14 km southeast of Bratislava, near the village of Čunovo. It is powered by flow diversion from the Čunovo dam. Since 1997, it has hosted a full schedule of local, regional, and international competitions, including the 1997 Slalom World Cup [14].

The Centre has two parallel whitewater channels; the drop is the same for both channels, 6.6 meters (Fig. 4 [15]).

Fig. 4: Water sport centre Čuňovo

The left channel is 356 meters long, with a 1.9% slope of 19 m/km and a streamflow of 7 to 22 $m^3.s^{-1}$. The right channel is 460 meters long, with a 1.4% slope of 14 m/km and a streamflow of 7 to 12 $m^3.s^{-1}$. When both channels are watered, the left channel streamflow is 15 $m^3.s^{-1}$ and the right is 7 $m^3.s^{-1}$. The two channels are connected at two crossover points, making a total of five alternative routes from start to finish. From a start in the left channel, there are three ways to run the course; from a right channel start there are two. Any run which ends up in the left channel includes a sheer final drop called "Niagara."

A conveyor-belt boat lift carries paddlers in their boats up to a 225-meter-long return canal on a level with the start pool [14].

Ondrej Cibák Area of Water Slalom

Ondrej Cibák dedicated his whole life to whitewater. He represented the country; he was a trainer and a pioneer in designing and building the slalom tracks. He supported the building of the boathouse and the Area of Water Slalom in Liptovský Mikuláš [16] (Fig. 5 [17]).

Fig. 5: Ondrej Cibák Area of Water Slalom in Slovakia – reconstruction

The tracks fulfil the most demanding criteria and many national and international championships take place here. When there are no championships taking place, the area is a pleasant place for relaxation with a lot of small bridges over the tracks, paths, benches and green terraces. We can see his artificial canals not only in Slovakia but also in Italy, Macedonia, Finland, Germany, Croatia, Spain and Sweden [17].

Presently, there are three new whitewater courses planned in Slovakia. The first course is planned in Trenčianske Biskupice, on the left bank of the Váh River next to the weir. The second is the whitewater course complex in Košice at the Hornád River. It consists of three sections. The third course is planned in Červený Kláštor in the old riverbed of the Dunajec River [18].

Conclusion

The whitewater course designing parameters have to accept the requirements on the structure; especially if planned course have race or training character, then consideration of character of the water sports performed on the course (slalom, rafting, freestyle), safety regulation as well as level of sportsmen abilities.

Thanks to our sportsmen success (Jana Dukátová – double world champion, European champion, triple world cup winner, etc., Michal Martikán – double olympic winner Atlanta 1996 and Bejing 2008, etc., Elena Kaliská – double olympic winner Athens 2004 and Bejing 2008, etc. or Pavol and Peter Hochschornerovci - triple olympic winner, once bronze, five time world champions, six time gold in European championships and others), there is a huge development in water sport channels construction.

Target groups of interest could not only be professional sportsmen but also amateur water sport enthusiasts. Children could easily be attracted to this sport which could provide solid youth base for pro sport career. Even recreational advantages of such channels will also attract tourists ranging from local to wide area of residence.

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STEAM COG TRAINS OVER THE SLOVENSKÉ RUDOHORIE MTS.

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Abstract
From the 19th in the seventies of the 20th century, Czech, Moravian and Slovak forests to promote the most efficient mode of transport timber and in many cases forestry staff narrow gauge forest railway. Most of them were in the Slovak Republic, a relatively dense network was in Moravia.
The thirty-five kilometres long railway Brezno - Tisovec, which continues along the Rimava valley up to Jesenský and which is designed for tourism, is found in the Slovak railway timetable under number 174. This is a really unique railway – it is the only railway with the standard track gauge and rack-and-pinion operation in Slovakia. Until today, there are about six kilometres with rack and pinion, although adhesion traction is used there. However, introduction of leisure railway with steam cog trains is being prepared.

Keyword: railway, Brezno – Tisovec, track

The origin of the railway Brezno – Tisovec was connected with the construction of the first sections of Pohronská railway from Zvolen to Podbrezová and later to Brezno nad Hronom. A year later, in 1896, a sidetrack to Pohronská Polhora was built. This was continued by a rack railway that went over the mountain saddle Zbojská under Fabova hoľa to the centre of iron in the valley of the Rimava River, Tisovec. The track provided transport of raw iron from Tisovec ironworks to steelworks in Podbrezová. Originally, there were steam cog locomotives made in Florisdorf, Austria. When the Tisovec ironworks ended in 1966, so did the freight transport; only personal transport continued but this was changed from steam traction to adhesion motor engines in 1933.

Railway Brezno – Tisovec starts in railway station Brezno. This town, lying in the centre of the Horehroní Region on the crossing of an ancient trade route connecting Gemer and Liptov, is an economic, cultural and trade centre of the Horehroní Region. The oldest written mention about the settlement of this territory comes from 1265. At that time, rich sources of iron ore were found there and brought about development of the town and its surroundings. In 1380 Brezno gained town privileges.
Further economic development came in the 19th century, when iron and steel industry developed in the town nearby, Podbrezová. Later, Brezno became one of the most important centres of national life in Slovakia; it was even planned as a place of headquarters of the newly established Matica Slovenská. Brezno was the birth place of the first vice chairman of this important Slovak cultural institution – Karol Kuzmány. Moreover, other important personalities of Slovakian cultural and economic life worked there – the playwright Ján Chalupka, the collector of Slovakian folklore Adolf Peter Záturecký, the writer of Slovakian children stories Pavol Dobšinský, and the pioneer of modern forest management Jozef Dekrét Matejovie.

Fig. 1: Diesel train at the Zbojská stop

The town and its surroundings are interesting for tourism as well – there is Bystrianská Cave near Brezno, well known due to successful treatment of asthma, there is the popular holiday resort Tále and skiing centres Čertovica and Mýto pod Ďumbierom. Then, it is not far to the main ridge of the Nízké Tatry Mts. with the most popular highest peaks Ďumbier and Chopok. People interested in narrow gauge railways can be recommended to go to Čierny Balog, where a part of the former Čiernohronská forest railway from Chvatimech and Hronec to Čierny Balog and its valley Vydrovo is operational. In 2012 railway operation was started in the section from Čierny Balog to Dobroč, where regular personal transport is assumed.

Fig. 2: Information boards Muran Plateau National Park at the Zbojská railway station

When you leave station Brezno, the motor train takes you through the valley of the Hron River and then, at the crossing Brezno – Halny, turns south to the valley of the Rohozná stream. From the station with the same name, the track goes parallel with the road nearly to Tisovec. In twenty minutes, you reach station Michalová. This municipality was established in 1786 in relation to extraction of iron ore. Later, when the mines ceased to exist, Michalová inhabitants started to make their living in forests, at the railway and later in the surrounding industrial plants. The next municipality – Pohronská Polhora – is almost connected with the previous one. This village was founded at the end of the 18th century by the mining chamber with the purpose of extracting iron ores and in 1795–1800 a blast furnace was built there. However, it was eliminated when mining activities ceased. The above mentioned forest expert, Jozef Dekrét Matejovie, worked in this village.


Fig. 3: Koliba the Zbojská hut

There is a marked trail going from Pohronská Polhora to the highest peak of the main ridge of the Veporské vrchy Mts., Fabova hoľa (1439 m a.s.l.). Although its name suggests a bare area, the view from this peak is obscured by a spruce stand. The marked trail from Polhora to

the opposite side is attractive going across meadows and forests with dispersed settlements, which usually serve as holiday homes today.
The most beautiful section of the track starts behind Pohronská Polhora, below the former guarding railway house, above the bus final station. It is 5.836 km long track section where the Abt system of a rack railway has been preserved until today. This rack section ends in front of station Tisovec - Bánovo. The track goes across meadows under the tree line and above the Jánoškovo cabin, there is a steep climb of over 52 per mil to station Zbojská, a former railway station, which today serves as a holiday house of the Slovakian Railway Company. The other railway buildings have also been changed to holiday houses. From saddle Zbojská (725 m a.s.l.) you can take marked trails over secluded dwelling Kučelach with beautiful views of Muráňská planina and Tisovec, Fabova hoľa or, on the other side, Diel, Machniarka and Klenovský Vepor (1338 m a.s.l.). Zbojská is crossed by red marked Rudná magistrála (Ore Road). The spreading beech tree in Zbojská invites you to taste crystal water from the spring underneath.
Behind Zbojská, the rack railway drops steeply to the Furmanecká dolina valley. This eleven-kilometre-long canyon goes along the Furmanecký stream between Zbojská and Tisovec. The track overcomes a difficult terrain there, using technically remarkable viaducts, sometimes cutting into the steep slopes of the valley. The most beautiful section of the Furmanecká dolina is the Čertova dolina hollow. There are inaccessible cave formations, some of them visible from the train windows. The best known of them is Čertova Cave, which is unfortunately inaccessible for the public. This track section resembles the romance of better known and more popular Austrian and Swiss mountain tracks.
The following stop, Tisovec – Bánovo, originally a railway station, and its surroundings are a well known and popular skiing resort, mainly for inhabitants of Rimavská Sobota; it is also the starting point of a marked trail to saddle Bánovo. Just in front of Tisovec, the train goes through a tunnel and out of the tunnel the station and the first houses of the town come into view.

Fig. 4: The train passes through "Ďábelský most''

Tisovec is located in a picturesque valley at the confluence of three streams that form the Rimava River. It is surrounded by promontories of the Stolické vrchy Mts. and Veporské vrchy Mts., offering a lot of options for hiking. A popular hiking target is Hradová, standing right over the town. Its rocky ridge with great views can be reached along a yellow marked trail in two hours. There are remnants of a medieval castle, destroyed by the emperor's army at the end of the 17th century. Other marked trails will take you along the Martinova dolina valley to the close Voniaca, which offers nice views of the Rimava valley and Tisovec.
Tisovec was founded in the 13th century as a mining settlement. In 1440–1462 it was ruled by Jiskra's army. The industrial development came in 1762, when a blast furnace was built in the town together with ironworks, which were operational until 1965. The town was one of the centres of Slovakian fight for national existence. There were such personalities of the Slovakian political and cultural life as Štefan Marko Daxner, co-author of Slovakian Nation

Petitions, Pavol Jozeffy, who led a deputation of Slovaks to the emperor, and also a politician of the recent history, Vladimír Clementis.
Those interested in railway history should not forget to see constructions of a never-put-in-operation track Tisovec – Muráň, built in the period of the Slovak Republic. There is a railway tunnel portal next to saddle Dielik and a hidden viaduct of this planned but never finished track at the beginning of the Martinova dolina.
Track Pohronská Polhora – Tisovec has been on the list of national technical monuments for over five years. It is used for a regular personal transport but since November 2005 it has been used for leisure transport of tourists. This service is provided by citizen association Zubačka v Tisovci in June, July, September and December. The used train is a reconstructed historical adhesion motor train of series 820 0039. These rides take place on demand. A ride in groups is recommendable, at best when the train capacity of 50 people is fully used. The trip from Tisovec to Pohronská Polhora and back, with stops for refreshment and taking photos, takes three hours, but it is definitely worth it. A steam locomotive should be added in the near future. This will be housed in the old Tisovec depot after it is repaired. There will be a railway museum with engines, railway cars, turntable and other original equipment. The museum will be built using subsidies from EU structural funds.
In 1964 and 1965 the rack section of the railway was reconstructed but it was never used again as the personal transport was provided by adhesion motor trains and freight transport was cancelled at the time of cancelling the ironworks in Tisovec in 1966. The rack part of the railway has been preserved in a complex and unworn state. Until today, only two rack railways with standard gauge have been preserved. The other one is in the Czech Republic: track Tanvald - Kořenov from 1902 with a length of rack section of 6.652 km.

Fig. 5: Historic vehicles ready for visitors rides on Zbojská mountain pass

Four cog-adhesion steam locomotives of series T IVb with numbers 4281–4284 MÁV were provided for this railway by the Austrian locomotive producer Florisdorf in 1896–1900. They were used for regular personal transport until 1933, and for freight transport until 1955, then as work trains sporadically until the 1960s. In the following ten years they were all destroyed. A similar rack railway with a standard gauge was built in the Hungarian Empire in 1908 – it was between stations Cáransébes and Subcetate in Transylvania, Romania. When the operation of the Romanian rack railway stopped in 2002, there was danger that these locomotives will be destroyed. Thanks to sponsorship of a German-Slovak businessman, Ing. Hauswald, and with a support from Čiernohronská Railway, n.o. Čierny Balog and a Romanian partner George Hocevar, two of the endangered locomotives (T IVc 4293 and 4296) were purchased and transported to Slovakia. At present, they are in the collections of the transport museum.

A specific aim of the project is touristic operation of historical steam trains with a capacity up to 300 places in track Podbrezová - Brezno - Tisovec. The fact that this train needs to be pushed in the section Pohronská Polhora - Zbojská, or Bánovo – Zbojská, in a speed of 12 km/h, offers an extraordinary experience of the ride on the first pushed car. That is why both ends of the train will have a special observation car with a glazed part of roof and will offer simple refreshment.

This aim can only be achieved if one of the steam locomotives is put in operation; the other one will be used as an exhibit in the museum Tisovec and will serve as a source of spare parts. It will also be necessary to build the two observation buffet cars, reconstruct the destroyed run-in block of the rack railway in Zbojská and to provide an option to run around the locomotive in Zbojská pass-by. Moreover, accommodation will have to be provided in station Tisovec for an adequate number of visitors interested in the railway. Since 2005 the steam cog locomotive 40.006 CFR (ex T IVc 4296) has been repaired in company OKV Martin. The repair is assumed to finish this year.

After the train ride, visitors can go along educative brigand trail of the legendary Tisovec brigand Jakub Surovec and his band, who escaped the soldiers from saddle of Zbojská through inaccessible Čertova dolina. The path is one-way (from the bottom upwards), the starting point is at the information centre in the Brigand's Court (Zbojnícky dvor) and continues parallel with the red marked Rudná magistrála towards Remetisko, where it leaves the Rudná magistrála and continues over the Makovo koryto valley under viaduct Čertov most and to the start of Čertova dolina. When hiking the Rudná magistrála from the west to the east, you can turn to the trail in Remetisko. After a short digression to Čertova Cave and Čertova dolina, the educative trail comes back to Zbojnícky dvor over meadows Pacherky and shepherd's hut in Galička.

The trail with sixteen stops is marked green-white as is usual for educative trails and it is 4.7 km long with 268 m of elevation difference. The time necessary to take the trail is 3 hours in firm boots as a part of the trail goes along wet and slippery rocks of a valley. The narrow is accessed in a way close to nature – there are no step irons or metal ladders. Therefore, there is neither a paved surface nor a comfortable path. The trail leads along a rocky bed of the Čertov potok on boulders and gravel, where you have to jump from one bank to the other without any bridges. Only three places are secured by wooden ladders to overcome a rocky shelf with waterfalls. Passing the narrow of Čertova dolina can be even dangerous in the period of heavy rains and in winter! The trail can be taken with a paid guide, who can be ordered at the information centre of the shepherd's hut Zbojnický dvor in Zbojská.
Čertova dolina may hide brigand's treasures in its caves. However, we will not need them in the shepherd's hut Zbojnícky dvor, where refreshment after the difficult trail is offered. You will certainly find it because of the herds of sheep but also the smell of bryndza cheese halushki as well as excellent mutton. Folk music and folk costumes will make the atmosphere pleasurable to taste sheep cheese and homemade sausages as well as local drinks.
And if you wish to continue in your way along the mountains and forests of the Slovenské Rudohorie Mts. even after the feast, you will find inspiration at the information centre. They will also inform you about the possible viewing of the mountains from the backs of Hucul ponies.

You will find more information about the rack railway and the shepherd's hut Zbojská and their surroundings at www.zbojska.sk.

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THE BRNO RESERVOIR – DRAINED

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Abstract
The study addresses reduction of water in the Brno Reservoir in 2008–2009. The reservoir was drained with the purpose of improving the water quality – reduction of the level of water was one of essential conditions for this. The intention was not to extract the sediments but to "freeze" them, change the Ph, and use the situation to implement bank stabilizations, clean the reservoir from foreign objects, etc.

Key words: Stabilisation, water, dam, bank, erosion,

Introduction

The valley above the Brno dam was first filled with water from the Svratka River in autumn 1939. The dam was not finished at the time but it was able to perform its function – hold a flood wave. It was put in full operation in 1940. Since then it had never been drained until 2008. The deteriorating quality of water had been the main reason for the decision to clean it made by the stream management institution - Povodí Moravy, s.p.

Procedure

The Brno Reservoir has over 4 mil. m^3 of sediments. About 15% of these come from eroded banks, the rest is mostly the material washed from fields along the stream above the reservoir. Strong eutrophication is the main cause of cyanobacteria proliferation. As the reservoir is very popular for leisure activities, water quality is one of the main prerequisites for the development of the area [1] [5][7].
After the water level reduction, the uncovered sediments were limed several times because the change in their Ph is vital for fighting cyanobacteria (Fig. 1,2).

Fig. 1: Sediment liming in the Brno Reservoir [2] [10] (Veveri)

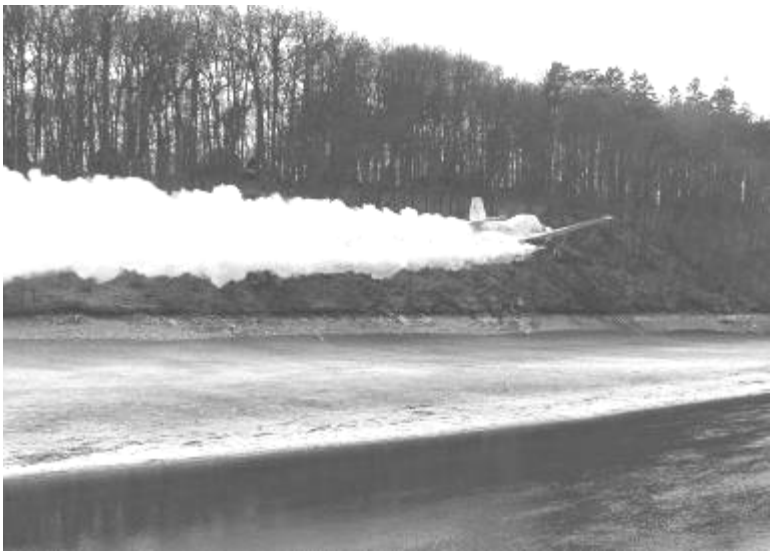

Fig. 2: Sediment liming in the river current of the Brno Reservoir

Another important part is leaving supporting sediments for weed growing (weeds use up some of the nutrients), their mowing and removing outside the reservoir. Freezing the sediments is another procedure hostile to cyanobacteria populations [5] [6]. The reservoir was left drained over winter so that the sediments could freeze.
Water level reduction also allowed for taking stabilization measures in the bank zone (Figs. 3, 4, 5)

Fig. 3: Construction of bank stabilization while the Brno Reservoir is drained [11] [12]

Conclusion
These procedures considerably helped to improve the water quality in the reservoir; however, they are not sufficient to maintain the water quality [2] [3] [13] [14]. Currently, the influx of sediments (and nutrients) to the reservoir is minimized by water aerating using a set of aerators during the recreation season and dosing coagulants at the end of backwater.

Fig. 4: The view of the drained reservoir and the Svratka River flowing through

Fig. 5: Bank modification in the area called Sokolské koupaliště, Brno Reservoir [8] [9]

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THE EFFECT OF LANDSCAPE CHARACTER CHANGE ON THE RECREATION FUNCTION OF A WATER MANAGEMENT CONSTRUCTION IN THE LANDSCAPE CASE STUDY: BATA CANAL, SOUTH MORAVIA (CZECH REPUBLIC)

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Abstract
Water structures in the landscape represent a significant part of the landscape infrastructure. This infrastructure has often important recreational functions. Conflicts of interest between nature conservation and recreational functions of water structures are fairly common. The aim of this study is to assess the impact of reconstruction of the Bata Canal in Southern Moravia on the landscape character in the context of the recreational function of the canal. The study suggests the possibility of a compromise provided that both the water management interests and the interests of nature conservation are applied rationally and without any dogmatic attitudes.

Keywords: Bata Canal, landscape character, leisure use, water structures

Introduction

Landscape is a part of the Earth's surface with a characteristic relief that is formed by a system of functionally interconnected ecosystems and civilization elements (Míchal 1999). Landscape character is the natural, cultural and historical character of a place or an area (Löw & Míchal 2003). In the Czech Republic, landscape character is protected by law (Vorel et al. 2003) against activities reducing its aesthetic and natural values. According to the law, changes of the landscape character, mainly placement of buildings or other structures, can only be implemented with respect to the maintenance of significant landscape elements, specially protected areas, cultural dominants, the harmony and relations in the landscape.

Material and methods

This study evaluates the effect of the prepared cleaning of a part of the Bata Canal section in the cadastral area of Petrov and Sudoměřice. The project proposes to remove sediments from the barge canal in a part of a section of the Bata Canal. The sediments were deposited in consequence of neglected maintenance and removal of self-seeded woody stands from the canal flow profile. In relation to the efforts, newly arisen after 1989, to start using the Bata Canal for recreation cruises, there have been demands to restore the original state of a part of the canal section, i.e. the state in which this water management construction was approved. Among others, the project designer used the conducted Assessment of Construction Project Consequences in the Area of Natura 2000 (Machar 2005) and the project respects the conclusions of this assessment.

The sediments in the Bata Canal have not been properly cleaned away since 1970. Later, only sediments at some locations in the left part (left bank) of the bed were removed and cast to the right side so that the flow of the canal was facilitated. Due to these mentioned facts, the sediments now present in the canal reach a thickness of 0.8-2 m, based on the measuring of cross profiles. The left bank of the bed profile has been freed from self-seeded woody plants, and only thinning has been carried out on the right bank. Currently, a reconstruction of the boat turning basin at the former tipping plant, i.e. removal of sediments, partial removal of self-seeded woody plants and construction of islands in the middle, is in progress.

The aims of the project, in the established canal section (km 5.768–km 1.972), are to excavate sediments on the right side of the canal to the level of the original bed profile (the original bank reinforcement by concrete tiling) and to repair some places of the original concrete reinforcement on the right bank. At the same time, the project proposes removal of the remaining self-seeded woody plants on these sediments on the right bank. On the left bank, the sediments should only be removed at a slope of 1 : 1 from the canal bottom to the level of the stable water retention in the canal and not up to the original concrete tiling. Removal of sediments and a local repair of tiling will be conducted in the current structures (siphons, bridges, head regulators and outlets). According to the project, the excavated sediments will be dumped in the cadastral area of Sudoměřice, on the right of the barge canal, between a dirt road, storm drain and road I/55; the assumed height of the tipped fill is 0.5 m, the fill will be covered by the original arable land 15 cm thick.

To evaluate the effect of the project on the landscape character of the defined place, we used the method of the project photovisualization. The method can reduce the extent of subjectivity when evaluating the changes of the landscape. However, it is necessary to take into account that a horizontally photographed landscape section made by a camera with focal length of 35 mm, takes about 50°. A human eye perceives an angle of 180° but the sight focuses on a section of 40-65°. After a detailed field survey, it was decided to focus on the evaluation of the project effect at the scale of the place of landscape character, due to the linear character of the Bata Canal and the character and range of the project for the Bata Canal cleaning.

Landscape definition of the evaluated project

"The place of landscape character" was defined as the area bordered by railway Sudoměřice – Petrov in the south, with the background of landscape gently rising towards Petrov, and by the power transmission lines 22 kV in local routes "Podmoravský les" and "Horní Štěpnice" in the north. This is a lowland, mainly flat landscape type of agricultural (predominantly field) land in an alluvial plain with a relatively dense settlement of individual close municipalities and a relatively large amount of anthropogenic elements, especially linear constructions (railways, roads, transmission lines, agricultural drains, usually linear dirt roads, the anthropogenic shape of the Bata Canal as an obviously artificial water management construction). The landscape dominants of the territory are anthropogenic linear forms of roads and the canal as well as the close municipalities. Besides the Bata Canal (a technical monument), another significant sight in this territory is the place of folk architecture of wine cellars Plže in Petrov. The altitude along the Bata Canal is about 166–167 m.

"The place of landscape character" was defined as a markedly linear landscape element consisting of the bed of the Bata Canal together with its banks and self-seeded woody plants, the parallel draining canal and water management and other structures on the canal (siphon, bridges, head regulators, outlets).

Historical and cultural description of the landscape character of the Bata Canal

The historical and cultural character of the Bata Canal in the section Petrov – Sudoměřice is based on the fact that it is an artificial water management construction – a barge canal, which uses modified (channelized) sections of former natural streams. Currently, the Bata Canal is in fact a technical monument, operated to a limited degree in agreement with the purpose for which it was built. However, since the 1970s the canal has not been maintained with the purpose of navigation. The canal has thus been gradually overgrown with vegetation and soil has deposited in it. The rebirth of boats in the Bata Canal in consequence of the social changes after 1989 has brought a significant turning point as regards the perception and sense of this technical monument. The Bata Canal has been gradually turning into a tourist attraction of the region. The development of recreation cruises on the canal has recently brought requirements to restore the navigable canal profile into the original state. However, wildly living populations of the beaver spread to the catchment area of the Morava river in the 1990s and the beaver started to inhabit the Bata Canal overgrown with vegetation. The presence of the beaver was even the reason for inclusion of the Bata Canal in the system of European significant sites Natura 2000. This is the cause of the conflict of interests around the Bata Canal – between interests of the recreation cruises and interests of nature protection.

Cultural description of the landscape character of the Bata Canal

Detailed characteristics of the natural conditions of the Bata Canal in the studied section Petrov – Sudoměřice were presented in Čmelík et al. (2003).

The Bata Canal in the section Petrov – confluence with the Morava river forms a border of the "Nature Park Strážnické Pomoraví". The nature park was established by a decree of the former District Authority Hodonín in 1993 with the purpose of protecting the landscape character of the Morava river alluvial plain in a total area of 31 km^2. The most remarkable landscape phenomenon of the nature park is the preserved meandering section of the Morava river in the floodplain with a floodplain forest in contact with an edge of air-blown sands (Natural Monument Osypané břehy). The Bata Canal is "a significant landscape element". A significant landscape element is an ecologically, geomorphologically or aesthetically valuable part of landscape that forms its appearance or contributes to its stability. The Bata Canal has been included in the areas within Natura 2000. It is a part of "European significant site Strážnicko", defined in appendix of CR Government Decree no.132/2005 Coll. under site code CZ0623797.

Evaluation of the project by the method of photo visualisation

The planned removal of sediments from the bed of the Bata Canal will not be obvious even at the scale of the defined place of landscape character. As regards the detailed scale of the place of landscape character, the landscape character could be affected by the planned dumping site of excavated sediments, which will be created at road I/55 cadastral area Sudoměřice. To eliminate a potential negative effect of the planned dumping site on the landscape character, I suggest a partial modification of the project in the conclusion of this evaluation. For this reason, the dumping site is not a subject of photo visualisation.

The most serious impact of the project on natural features of the landscape character will be the planned removal of self-seeded woody plants in the Bata Canal bed, which will influence the landscape character mainly within the scale of the place of landscape character. Therefore, the state after the implementation of this measure – removal of woody plants – is pictured by the method of photo visualization and included in the photo views taken from landscape important directions at the place of landscape character.

We have to note that the photo visualisation is only illustrative and cannot capture the state after the measure is taken precisely. The investor assumes that some selected woody plants will remain permanently in the canal bed after an agreement with the nature protection authority that will issue the felling permission. The selection of specific trees to be felled and the selection of the maintained trees will be performed during a field survey. At the conclusion of the evaluation, I recommend leaving mainly selected grown-up (the oldest) trees and the photo visualisation respects this recommendation. The evaluation of the impact of "removal of woody plants from the bed" on the landscape character at the scale of a place of landscape character cannot be objectivised any further. In my opinion, based on the knowledge of the history of the place of landscape character, the planned removal of trees will reduce the value of the landscape character at the scale of a place of landscape character slightly and temporarily and the extent of the change will be acceptable. The temporary character of the reduced value is caused by the fact that the compensatory planting, which will be done on the dam toe of the Bata Canal (see the ending of the evaluation), will be a suitable measure compensating for the temporary loss of the aesthetic quality of the canal, naturally at the time when the planting starts performing its aesthetic and ecological functions.

The photo visualisation (fig. 2-3) is further used for the evaluation of the project impact on individual aspects of the landscape character and for formulation of conclusions.

Evaluation of the project impact on natural features of the landscape character

Removal of sediments from the Bata Canal bed will affect the progress of the succession of plants (will stop the spontaneous succession of the plant vegetation on the sediments). However, from the perspective of the landscape character this will not be obvious at the scale of a place of landscape character. Moreover, a part of the stands of littoral herb vegetation will remain on the left side of the canal, where the removal of sediments is not planned up to the original concrete bed.

The planned dumping site of the excavated material (sediments) at road I/55, with a height of about 0.5 m and an area of 300 m x 400 m, could become a foreign element in the landscape. The surface of the site is planned to be levelled, humus added and used again for agricultural purposed. However, according to investor's statement, the sediments will be probably dumped to a higher number of smaller areas with a lower layer of the dumped material, based on negotiations with land owners. From the point of view of the landscape character, there are no troubles here; the dumping site will not be obvious in the surroundings when reused as agricultural land.

The planned removal of self-seeded woody plants (trees and shrubs including stumps) on the right side of the canal bed will have the most remarkable effect on the landscape character. The woody vegetation, as follows from the photo visualisation, is a basis of the natural aspect of the landscape character of the Bata Canal, mainly at the scale of a place of landscape character. The removal of self-seeded woody plants itself, without a corresponding compensatory measure, would have a considerable negative impact on the landscape character. Unless this removal is eliminated by a compensatory measure, it will lead to a permanent reduction of the value of landscape character.

From the perspective of maintenance of a significant landscape element (SLE), such as the Bata Canal, the planned removal of self-seeded woody plants from the canal bed in combination with a future removal of sediments on the left bank to the level of the original concrete tiling would be negative. The self-seeded stands and littoral vegetation on

the sediments are an essential (determining) component of the SLE ecosystem. If this measure was taken without a following compensatory measure in the form of a compensatory planting, the eco-stabilization function of the SLE would be significantly reduced.

Evaluation of the project impact on cultural and historical features of the landscape character

As has been mentioned, the Bata Canal was built as a water management construction. The anthropogenic origin of the Bata Canal is emphasized by its linear character – very long engineered straight sections, elongated regular bends, a regular cross profile of the canal, a number of small water management structures and bridges.

The fact that the Bata Canal is an old water management structure, today a technical monument, leads to its perception as a landscape element. The planned project of cleaning (including removal of self-seeded woody plants from the bed) with the purpose of providing the original state will renew the original appearance of the canal. We can say that the project implementation will restore the original historical features of the landscape character of the Bata Canal.

From the cultural perspective, at the time of its origination the navigation on the Bata Canal was motivated by economic reasons (which have never been fully met). Currently, the significance of navigation on the Bata Canal is recreational and touristic. We have to note that recreation cruises on the Bata Canal are related to a number of other tourist activities in the region.

Usage of the Bata Canal for recreation cruises is related to (1) attractiveness of the canal as a unique tourist destination of this type in the entire region, and (2) the fact that the cruise takes place in a relatively nice “natural” environment, from the point of view of lay visitors. The removal of self-seeded woody plants from the canal bed can be perceived by the tourists as a negative influence, reducing the good feeling they have in relation to the cruise in a “natural” environment, consisting of the woody plants on the banks. Moreover, it is certain that the visitors (recreation cruise users) are excited by seeing natural phenomena during the cruise, one of them being the trees on the banks browsed by the beaver. In conclusion, a recreation cruise on an artificial canal with an absence of “natural” elements, mainly trees, will not be perceived positively as a cultural experience.

Therefore, if the woody plants are removed from the canal bed without a proper and appropriate replacement by a quick and high quality planting, this will be a significantly negative effect on the cultural features of the landscape character of the Bata Canal. For the same reason, it is necessary to leave some trees in the canal bed so that the beaver can browse it and thus provide tourist attractions.

As regards maintenance of cultural dominants in the landscape, the planned project will not have a negative effect on the landscape character. The project implementation will not affect the distant views of the landscape and its dominants or their perception of the horizons. The Bata Canal itself is a significant linear dominant of the landscape with a cultural subtext (recreation cruise, artificial water management structure) and the evaluated measures will lead to the maintenance (restoration) of this character.

As regards the maintenance of harmony and relations in the landscape, the removal of sediments will have no effect on the landscape character. Removal of all self-seeded woody plants from the bed would have a slightly negative effect on the harmony of the landscape as an opened up and irregular belt of a woody stand along the Bata Canal is perceived as a view barrier with a natural function (positively perceived) of a distant view background, especially from the road Sudoměřice – Petrov.

Conclusion

The evaluated project in the presented form can have a negative impact on some features of the landscape character (mainly natural and cultural ones). However, as the removal of sediments from the Bata Canal for the purposes of recreation cruises can lead to a restoration of the historical appearance of the landscape character of this water management construction, these modifications (additions) of the project have been proposed:

1. The compensatory planting of new woody plants as a replacement of the woody plants removed from the canal bed will be conducted to a larger extent than the presented project proposes. The planting will be done on the dam toe at both canal banks in the section where the removal of woody plants will be performed. The planting will have a form of locally interrupted linear belt of broadleaved trees and shrubs of exclusively home species, mixed in groups. For this extent of planting

it is necessary to complement the evaluated project with an independent simple implementing planting project that will specify the species composition of the planting, individual protection of the planted plants as well as the following long-term maintenance. The individual protection is mainly important because of the beaver browsing and the permanent maintenance also has to include protection against beaver browsing. The planting should be performed by a professional company.

2. When selecting trees and shrubs to be felled and those to be left in the bed, the priority will be a selection of the oldest trees suitable for a permanent retaining in the canal bed. However, these trees have to be protected against the beaver browsing immediately by an individual protection, at best the rabbit fencing.

3. The excavation of the remaining part of sediments on the left side will not be conducted in the future within "maintenance" as the evaluated project assumes. These sediments will be retained permanently for the possible existence of the littoral vegetation belt. The littoral belt (reed) can be maintained by regular scything and thus a more abundant growth will be prevented. Scything is only possible outside the bird nesting period (from August 30 to the end of the year).

The removal of self-seeded plants on the right bank of the Bata Canal bed is necessary for the sense of the planned project implementation and its aim, which is recreation cruises. Should the Bata Canal be operated as a navigation canal, the existence of trees and shrubs in the bed, which is quite narrow, is troublesome. The extent of the compensatory planting, as has been proposed in the evaluated project (i.e. a piece for a piece) is not sufficient and does not reflect the extraordinary ecological significance of the site. The self-seeded woody plants in the bed perform important ecological functions for the SLE and they are an essential element of the natural aspect of the canal landscape character. At the same time, from the cultural perspective of the landscape character, they form an important "natural background" for the recreation cruises, provide attractions (beaver browsing) and provide the straight canal with a "more natural" character, reducing the potential negative feelings of cruise participants stemming from the strictly technical body of the canal. In my opinion, the above mentioned modification (additions) of the project will mitigate the impact of the removal of self-seeded woody plants on the landscape character to an acceptable level. The measure of the compensatory planting will also secure that the eco-stabilization function of the SLE will not be significantly and permanently endangered.

It is important to remember that the explored section of the Bata Canal forms a boundary of the Nature Park Strážnické Pomoraví, which was established to maintain the landscape character. From this perspective, the above mentioned modifications of (additions to) the project are necessary.

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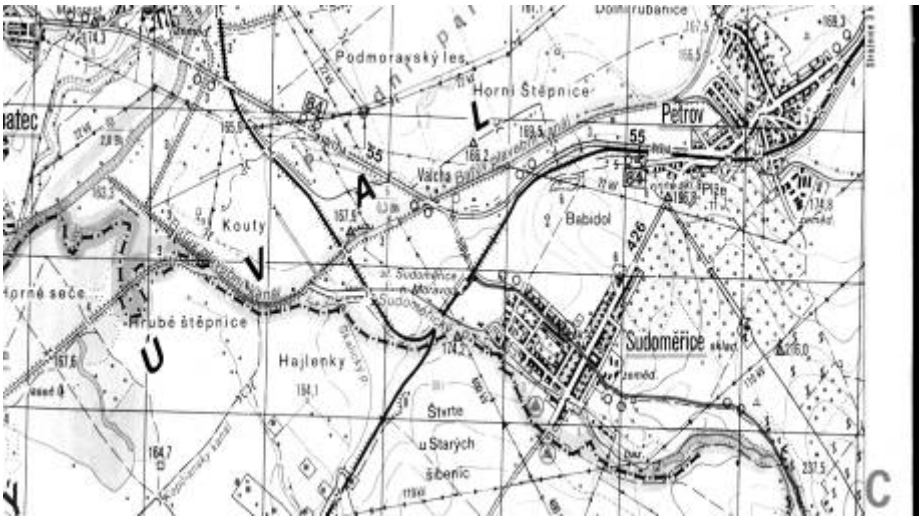

Fig. 1: Map of the research area

Fig. 2–3: Photo visualisation of the project – removal of trees from the Bata Canal bed

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THE HOUSE OF NATURE OF THE MORAVIAN KARST - OPPORTUNITY

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Abstract
The Operational Programme Environment, approved for the period 2009–2013, provides subsidies of up to 85% of all the investments that are used for the construction of visitor centres (Houses of Nature) funded by the financial means of the European Union.
The main places to enter and the most frequently visited places of the Punkva Caves (200,000 tourists every year) are the Rock Mill (Skalní Mlýn) and area of the Macocha Abyss. It is precisely these places that are intended to be improved by a building which is going to be called the House of Nature of the Moravian Karst. The building will have an information area with a shop and the main area will be used for a permanent exhibition. On the first floor you will find more information about the geological history (for example a model of the Devon Sea). A spiral staircase will take visitors into lit up premises on the second floor with an exhibition of living nature. In the screening room you will be able to choose from a range of short films (a projection of a 3D film about the Moravian Karst is planned).
The House of Nature of the Moravian Karst should be open all year round. The time when the number of visitors will be smaller will be compensated by offering programmes for schools including outdoor excursions.

Keywords: Protected Landscape Area, Nature protection

The Moravian Karst (Fig.1) with five caves accessible to public, unique natural and remarkable historical sights, is among the most popular tourist destinations in the Czech Republic. Only the caves are visited by over 350,000 tourists each year. There are many tourist trails and cycle-ways traversing this area. In the terrain there have been installed seven educational trails with boards. Visitors will find interesting information in the Museum in Blansko (ironmonger´s), in the exhibition of the Technical Museum in Huť Františka in Josefov (history of local iron ore processing), in the windmill in Rudnice (geology and speleology) and in the museum in Vilémovice (speleology). In several communities (mostly during the tourist season) there are small information centres working.
The very first Shelter Hut in the country belonging to the Czech Tourist Club was built at the end of the 19th century on the site of today´s Cottage by the Macocha Abyss. Making caves accessible and tourism infrastructure building started at the turn of the 20th century. The Sloupsko-šošůvské caves were have been made accessible since 1881, the Kateřinská Cave as we know it today was made accessible in 1910, the Punkva Caves between 1909 and 1933 and Balcarka Cave in 1925. In the years 2000–2009 there were extensive reconstructions of their technical equipment (new wiring, tourist trails repairs), new entrance areas were built by Sloupsko-šošůvské Caves, Balcarka Cave and Kateřinská Cave. The last cave that was open is Výpustek with its underground military shelter, which had been abandoned by the army. It was opened to tourists in 2006.
At present, Cave Administration of the Czech Republic, which operates the caves accessible to the public, is preparing an extension or eventually an installation of new exhibitions in these caves. In the Kůlna (Shed) Cave (part of the visiting circuit in Sloupsko-šošůvské Caves) a visitor learns about the life of Neanderthals, in Kateřinská Cave then about curiosities from the life of cave bears. Exploitation and making caves accessible is the subject of an exhibition in Výpustek.
Operational programme Environment for the period between 2009 and 2013 enables financing up to 85% of capital expenditure of visitor centres constructions (Houses of Nature) by the European Union. The House of Nature programme opened the possibility to construct facilities in protected and at the same time popular tourist locations, which will describe the values of the territory as well as reasons for their protection.
The starting points of the most visited Punkva Caves (200,000 tourists per year) are the Rock Mill and the area of the Macocha Abyss. The construction of The House of Nature in the Moravian Karst is prepared in these places (Fig. 2). The building includes an entrance information space with a shop. The main areas are occupied by a permanent exhibition. The first floor introduces the geological past of the Moravian Karst (e.g. Devon sea model),

karst landscape formation and formation of caves, ancient and contemporary life in caves. The spiral staircase takes the visitor into lit up premises on the second floor with an exhibition of living nature. In the screening room you will be able to choose from a range of short films. The range will also offer a 3D film about the Moravian Karst. A play room with karst motifs is designed for the youngest visitors. The indoor exhibition is completed by an outdoor exhibition. It will be possible to observe the passage of water through the karst landscape from sinks and drill holes across caves into springs on the karst landscape model. Blocks of rock with polished cuts will illustrate the rocks of the karst area.

The operation of the Moravian Karst Nature House is planned to be all year round. The period of poor visitor rate (autumn to spring) will offer programs for schools including field excursions.

A building permit for the construction of the House of Nature has been issued and investment funds have been allocated. The operation will be partially covered by its own revenue (entrance fee, sale) and by a grant from our Cave Administration organization. Towns, communities and some entrepreneurs have bound themselves by contract to provide nearly half of the operational funds.

Start of implementation is bound to the termination of the selection procedure. The start of operation can be expected in 2014. Generally oriented exhibition about the whole of the Moravian Karst in the House of Nature will be conveniently supplemented with thematic exhibitions in individual accessible caves.

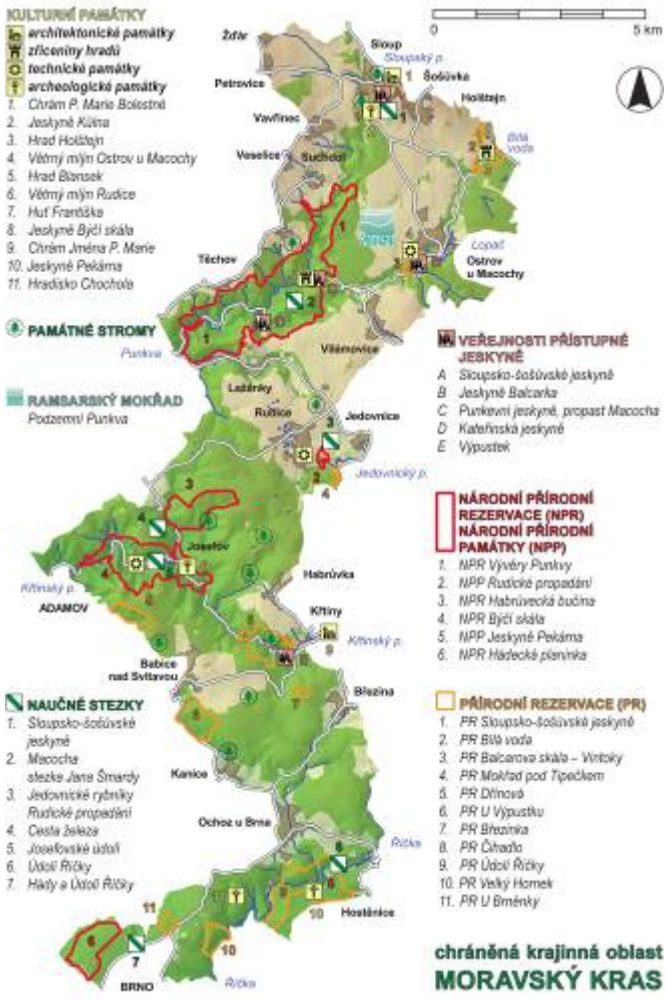

Fig. 1: Map of protected landscape area Moravian Karst visitor infrastructure (Ivan Balák)

Fig. 2: Visualization of the House of Nature (project PParchitects s.r.o.)

Summary:
The Moravian Karst with 5 caves which are accessible to public, its unique landscape and remarkable sights, is one of the most frequently visited places in the Czech Republic. The caves alone are visited by more than 350,000 tourists every year.
The Operational Programme Environment, approved for the period between 2009–2013, provides for subsidies of up to 85% of all investments which are used for the construction of visitors centres (Houses of Nature) funded by the financial means of the European Union. The Houses of Nature Program have created an opportunity to construct some buildings in the protected territories but also in some of the most popular places. These areas will give tourists closer access to values of this land and also to make them aware of the reasons why these areas should be protected.
The main places to enter the most frequently visited places of the Punkva Caves (200.000 tourists every year) are the Rock Mill (Skalní Mlýn) and area of the Macocha Abyss. It is precisely these places which are intended to be improved by a building which is going to be called the House of Nature of the Moravian Karst. The building will have an information area with a shop while the main area will be used for a permanent exhibition. On the first floor you will find more information about the geological history of Moravian Karst (for example a model of the Devon Sea), formation of karst chambers and origin of caves, ancient and present life in the caves. The spiral staircase will take visitors into lit up premises on the second floor with an exhibition of living nature. In the motion-picture theatre you will be able to choose from a range of short films. The projection of a 3D film about the Moravian Karst is planned. The youngest visitors will be catered for by a play room where karst themes will be depicted and shown.
The indoor exhibition will be supplemented by another outdoor exhibition.
The House of Nature of the Moravian Karst should be open all year round. The time when the number of visitors will be smaller will be compensated by offering programmes for schools including outdoor excursions. Planning permission for the House of Nature has been already issued and the investments for construction have been allocated. Running the House will be partly covered by its own incomes (entrance fees, tickets sales) and by a contribution provided by our organization and the Caves Administration. Almost a half of all financial investment is to be given by nearby towns, villages and by some local entrepreneurs.

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THE POTENTIAL OF THE LANDSCAPE WITH DISPERSED SETTLEMENT (CASE STUDY ČADCA TOWN)

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Abstract
Historical landscape structures represent specific, time-limited and spatially shrinking subtype of landscape structures as a whole. They have fragmentary nature and are remains from the former continual landscape. Such landscape elements create mosaic structures of extensively used small-scale landscape features of arable lands and permanent agricultural crops (permanent grasslands – meadows and grasslands, orchards), respectively currently unused areas with low degree of succession. The aim of the contribution is to characterize changes in mountain landscape with dispersed settlements, one of the unique features within landscape structure of Slovakia in the case study Čadca town. We analyzed ganges in the demographic situation and landscape development. Dispersed settlements "kopanice" change from living on the cottager areas. In this time 90% of empty houses in the dispersed parts are being used as cottages. There is a hypothesis that in 5 years more than 40% of the dispersed parts will be empty and they will be transformed to the recreation places. This process can avoid decline of these special settlements.

Key words: dispersed settlements, Čadca town, landscape potential

Introduction

One of the preserved historical landscape structures in Slovakia is dispersed settlement. Dispersed settlements as such are not observed in the census, while they are not the basic statistical units (BSU). Usually 1 BSU is composed of several dispersed settlements. The first mention of the number of homestead municipalities is provided by Janšák (1929) who identified 132 of them with 2176 dispersed settlements. The last complete census of dispersed settlements is from 1961 when in Slovakia there were 166 homestead municipalities with 2899 dispersed settlements on the area of 4640 km2, what represented 9.46% of the total area of Slovakia (Nahálka a kol. 1966). The increase in number of dispersed settlement villages and dispersed settlements can be explained by inaccurate earmarking in 1929 and not by the occurrence of new communities. Currently, the occurrence of new dispersed settlements is unreal (the need for new agricultural land, migration of population due to work opportunities). More likely there is a tendency of downfall of dispersed settlements, respectively their extinction. The term "kopanica" is not the only term denoting dispersed settlement on a basis of agriculture. What decided that this term became the one generally denoting this type of settlement which has different names in different areas (e.g. lazy, štále, rale, pľace, klčoviská, kopánky, nivky, vrchy, etc.) is probably the fact that the term explicitly expresses the way of obtaining and farming on the newly acquired land, as well as the fact, that on the national scale it is the most widely spread name denoting the given settlement type (it is predominant in three of five main dispersed settlement areas).
Data about the current overall status of dispersed settlements is unknown; some authors deal with individual villages, respectively groups of villages (Huba 1986, Lauko 1985, 1990; Petrovič 2005, 2006), although complete areas of dispersed settlements haven't been studied since 1961. It is this factor that influenced the objective of our research. In the contribution we focus on the biggest settlement with dispersed settlements in Slovakia – the town of Čadca.

Material and methods

Dispersed settlements in Čadca can be divided into six municipal districts. These areas are: Milošová (7 dispersed settlements), Podzávoz (9 dispersed settlements), Čadečka (16 dispersed settlements), Drahošanka (8 dispersed settlements), Horelica (27 dispersed settlements), and a municipal district consisting of parts Rieka (4 dispersed settlements), Vojty (4 dispersed settlements) and dispersed settlements in proximity of the town (3 dispersed settlements). We have currently identified a total of 78 dispersed settlements. As a basic material for information on dispersed settlements from 1961 was used a work by Nahálka et al. (1966), which is so far the only one comprehensively mapping the situation of dispersed

settlement in Slovakia. Situation in 2007 is based on a work by Gerát (2007). The present state of landscape situation in 2012 was mapped through difficult terrain research, through consultation at municipal offices of individual villages and through behavioral research in a form of questionnaire answered by native inhabitants.
A problem of dispersed settlements evaluation is the non-existence of available data at a level of individual dispersed settlements. When there is a comparison of the state of dispersed settlements in 2007 it is very convenient. It allows us to observe the current development of these settlements in a context of transformation changes. Currently, this form of settlement can't be evaluated in none of towns in Slovakia which were created from dispersed settlements, precisely due to the non-existence of such detailed statistical information. Similar works have been currently dealing with areas of Nová Baňa dispersed area and Valašská Belá dispesed area (Petrovič, 2006, Šolcová 2013). Based on these trends and natural predispositions of the area we may talk about a specific land-use, respectively its potential for the future.

Definition of the Territory
There are 5 areas with dispersed settlements in Slovakia, while the observed area (the Down of Čadca) belongs to the Javorník-Beskydy dispersed settlement area and its Kysuce subarea. The town of Čadca creates the historical center of 87 dispersed settlements village forming this subarea. Interest area of the town of Čadca is located in the northwestern part of Slovakia, in the northwestern part of Žilina region and in the center of Čadca district. The area of the town is 56.79 km2 and the population in 2012 (31.12.) was 25 144 with the population density 442.75/ km2 . The average altitude of the interest area is 415 m.a.s.l. and the highest point is Chotárny hill - 906.2 m.a.s.l.. The cadastral area lies at the contact of two geomorphological units: Javorníky and Turzovská highlands. The main recipient in the area is Kysuca river with its tributaries (Čiernianka, Čadečka, Rieka, Milošovský stream).

History of Settlement
More significant settlement of Čadca began in the first half of the 16th century and was associated with two waves of settlement. The first wave was herdsmen colonization and the second "kopaničiarska" colonization. During the first wave, there were shepherd herdsmen Romanians or Ruthenians coming to the Čadca area. They were nomads travelling with their herds of predominantly goats and sheep. They found enough grazing on previously unused mountain meadows and pastures in the Čadca area. The first written mention of the Čadca area is from the year 1565, where it is reffered to as dorf Tczaczka. Herdsmen collonization was relatively small, as only high mountain areas, which are difficult to reach were settled. Until
the 17th century it had been the only settlement near the central flow of Kysuca. Though there were dispersed sheds, they did not create administrative centers. In 1778 Čadca was promoted to town due to the high population rate, the fact it was the administrative center, it had its own school, rectory, etc. Since 1.1. 1878 Čadca has been the district town.

Results
Landscape and its structure is affected by the intensity of human land use. This intensity is also a subject to the area population. Therefore, this summarization is focused on comparison of center of settlement and its dispersed settlements.
Total % of population changes for the years 1961-2012 (Table 1) argues in favor of the center seat, the increase is progressive. Overall, during this period, the share of the population centers of 1.39%. The share of the population scattered parts fell by 0.61%.
Interesting is the increase of dispersed settlements population in the last 5 years in comparison of the overall decrease of population in the town core (tab.1). While the overall town population decreases (2.35%), this decrease manifests in the central part of the town. Population in the center decreased by 4.47%, on the other hand the population of dispersed settlements increased by 4.29%. This situation is reflected also in the overall proportion of dispersed settlements population in %, whose share increased from 24.14% to 25.79%. This phenomenon – increase of dispersed settlements population is currently very rare and due to this fact we evaluated also selected landscape potentials of these municipal districts which are created by dispersed settlements.
Currently, dispersed settlements do not fulfill their primary function which used to be agriculture, i.e. keeping of animals and growing crops associated with living in houses built from natural materials, especially wood.
We can't say that the inhabitants of dispersed settlements do not keep animals or grow crops, but we can certainly say that not as much as in the past. Surrounding meadows are managed

by the surrounding villages' collective farms. Dispersed settlements are currently used for residence and recreation. This function protects dispersed settlements from extinction.

Tab. 1: Development of the inhabitants in the Čadca town

	Population	Population of village centers	Population of dispersed parts	Share of population in settlements centers (%)	Population of dispersed parts settlements (%)
1961	11620	8556	3064	73,6	26,4
2007	25751	19533	6218	75,79	24,14
2012	25144	18659	6485	74,21	25,79
Difference (in %) 2007-2012	-2,35	-4.47	4,29	-1,58	1,65
Difference (in %) 1961-2012	216,38	218,08	211.65	1,39	-0,61

Evaluation of Čadca Dispersed Settlements

Milošová Municipal District

The inhabitants do not spend as much time as in the past on agriculture and animal breeding. In the immediate vicinity of some houses it is still possible to find a small field with potatoes, wheat or vegetables. At present, estates are covered with grass and are used as meadows with the upcoming succession, showing through shrub communities.

Dispersed settlements in this area are far from the town center and are used apart from being a residence also for recreation of Slovak, but often also Czech citizens, due to the closeness of the Czech border. Number of cottages is minimal, resulting from the fact that not only cottages, but also family houses are used for recreation.

A prerequisite for tourism development is a Natural Monument Megonky with occurrence of stone balls located near the settlement of the same name. There is a Milošovský pond build on the Milošovský stream near the settlement U Pívary, which is used by fishermen. The dispersed settlement Dejovka located in a remote part of Milošová has an attractive environment for recreation. This area has also a bike trail which crosses nearly all of dispersed settlements.

Podzávoz Municipal District

Land cultivation is carried out in a form of gardens in the vicinity of houses. Broader management was not recorded in this area. Like the majority of area, other estates are used as meadows.

There are not many prerequisites for recreation development in this municipal district. Its location predestined it to use dispersed settlements mostly for residential purposes. Apart from the cycling trail, there is no other marked tourist trail. Dispersed settlement "U Muchy" is the only one with a recreational potential due to its remote location.

Čadečka Municipal District

Livestock keeping was recorded in dispersed settlements U Králi and U Šimčiska. Near houses it is possible to see small gardens, mostly apple or plum trees. This area also preserved the narrow-band land management with growing potatoes and root vegetables. Remaining areas consist of meadows. There are some places with visible terraces created in the past to prevent land erosion typical for dispersed settlements areas and they can be spotted in every municipal district.

There is a marked cycling trail leading through the vast majority of dispersed settlements in the Čadečka municipal district and there is also a ski tourist trail leading through the dispersed settlement U Králi, what means that this area can be used for summer and winter recreation.

Dispersed settlement U Bobiara has no permanent residents and is used for recreational purposes only. Other dispersed settlements suitable for recreation are U Ramši, U Králi and U Šimčiska, which are furthest from the town center and just like other dispersed settlements; they are used not only by Slovak, but also by Czech tourists.

Drahošanka Municipal District

On the hillside over the railway where the dispersed settlements of the Drahošanka municipal district spread, we can notice fields cultivated by inhabitants of dispersed settlements. The rest of the area is occupied by the increasingly expanding meadow communities. In the dispersed settlement Bukov the land is cultivated by gardeners. We do not see any keeping of animals like goats or sheep, which used to be typical for the interest area.

Recreation area is located in the dispersed settlement Bukov with localized gardener area used mostly by town inhabitants who have their cottages and garden houses built here. Bukovský stream provides the inhabitants of dispersed settlement as well as the public with mineralized water. Like the majority of dispersed settlements, dispersed settlements Drahošanky also have a cyclist trail going through. Dispersed settlements Drahošanka and U Lišky located furthest from the town have a recreational potential. Primary function of the rest of dispersed settlements in Drahošanka is a residential function.

Horelica Municipal District

Majority of inhabitants of dispersed settlements in Horelica has small fields or fruit gardens in the backyard. Just like in other municipal districts, major part of usable land is overgrown with grass or shrubby vegetation. Breeding of livestock, mainly sheep was widespread in the past but at present we did not find any sheep herds.

Remote location of dispersed settlements U Bryndzary, U Chylka, Kravarky and Kýčera is the crucial factor of their current use as recreational areas. Apart from permanent residents there are also commuting cottagers who either build new cottages or reconstruct original buildings. Along marked tourist trails, there is also a ski tourist trail, which provides a year-round use of this area.

Municipal Districts Rieka, Vojty and Suburban Dispersed Settlements

Inhabitants here are managing on a small scale, thus the land use is weak nearly everywhere. The mountainous terrain of Rieka and Vojty is not suitable for growing crops. Majority of area is covered by forest and meadows overgrown by mountain herbs. It is possible to find small fruit gardens with undemanding woody plants near cottages or houses.

Suburban dispersed settlements are not situated in mountainous terrain like Rieka and Vojty and therefore have better conditions for growing crops. There are cultivated fields in backyards of houses in dispersed settlements.

In the Rieka municipal district, which includes the dispersed settlement U Husárika, stands a mountain hotel Husárik with a marked tourist trail leading to it. In the past, it used to be surrounded by forest, but at present, the half of the mountain the hotel stands on is exhausted. Ski slope which begins in the Rieka valley near the cottage Tri kopce and leads to the mountain hotel Husárik is out of order, but the town plans to complete tows and use these areas for recreation and tourism. Dispersed settlement Chramačka fulfills apart from residential function serves also for recreation and as a cottage area.

Dispersed settlements dispersed over the Vojtovský hill preserved their original character of dispersed settlement by typical architecture, though the original function has changed. It can be said that these dispersed settlements are used almost exclusively for recreational purposes as cottage areas. The surrounding can be used for mountain tourism or cross-country skiing.

The only suburban dispersed settlement with recreational potential is the dispersed settlement U Buty, as it has the advantage of being located near a forest.

Availability

The distance of dispersed settlement is a crucial factor determining the degree of potential dispersed settlement use; the closer the dispersed settlement to the town center, the more attractive for permanent residence and availability of services it becomes. Remote dispersed settlements are usually poorly accessible and these areas are suitable for development of cottages and dispersed settlements may serve for recreational purposes.

We chose a bus station as a center according to which we measured the distance of dispersed settlements in kilometers. The town was divided into 6 municipal districts: Milošová, Podzávoz, Horelica, Drahošanka, Čadečka and Rieka, suburban places and Vojty. Distances of dispersed settlements are divided in 4 intervals: 0-2km, 2.1-4km, 4.1-6km a 6 and more km (Tab 2).

As we can see in tab. 2, generally the majority of dispersed settlements falls within the interval 2.1-4 km from the central bus station. From these the majority is in the Horelica municipal district.

The highest number of dispersed settlements in the interval 0-2 km has the Podzávoz municipal district – 5 dispersed settlements, while Milošová, Drahošanka and Rieka, suburban places and Vojty do not have a single dispersed settlement in this interval. The closest to the central bus station is the dispersed settlement Podzávoz (Podzávoz municipal district) – 0.63 km.

Most remote dispersed settlements, i.e. the ones in interval 6 and more km, were in the Čadečka municipal district – 6 dispersed settlements. Municipal districts Podzávoz, Horelica and Drahošanka had no dispersed settlement in this interval. The most remote from

the central bus station is the dispersed settlement U Ramši in the Čadečka municipal district – 8.8 km.

Tab. 2: Distance of dispersed settlements from the town center

Municipal district/ number of dispersed settlements	Distance from the central bus station			
	0-2km	2.1-4km	4.1-6km	6 and more km
Milošová	0	1	3	3
Podzávoz	5	4	0	0
Horelica	3	17	7	0
Drahošanka	0	5	3	0
Čadečka	3	5	2	6
Rieka, Vojty, suburban dispersed settlements	0	4	5	2
In total	11	36	20	11

Discussion

An important factor in terms of possible preservation of dispersed settlements is the number of permanent residents. This factor is in Čadca quite different from other parts of Slovakia. Authors such as Lauko (1985), Petrovič (2005, 2006), Šolcová (2013) present a significant decline of dispersed settlements population in various parts of Slovakia. On the other hand, the population of dispersed settlements in Čadca increases. This factor may be influenced particularly by the good access to the core of settlement. This is confirmed by a number of inhabitants of individual dispersed settlements. There is only one which does not have a permanent resident, but a total of 21 has more than 100 of inhabitants (tab. 3). Dispersed settlements with the largest population grows at the expense of the town center, as they do not have a convenient location, while we can observe the decrease of population of more remote and worse accessible dispersed settlements.

Tab. 3: Population of dispersed part in Čadca town

Municipal district/ number of dispersed settlements	Dispersed settlements population						
	0	0-10	11-50	51-100	101-150	151-200	201 and more
Milošová	0	2	1	1	1	1	1
Podzávoz	0	1	0	2	1	1	4
Horelica	0	2	11	12	2	0	0
Drahošanka	0	0	3	3	2	0	0
Čadečka	1	2	4	4	1	1	3
Rieka, Vojty, suburban dispersed settlements	0	4	2	2	0	2	1
In total	1	11	21	24	7	5	9
Total in %	1,28	14,13	26,92	30,76	8,97	6,41	11,53

This factor (maintaining respectively growth of population) may in the future support the upkeep of landscape. In accordance with the European Landscape Convention the objective of Slovakia is to identify and define types of landscape with regard to their particular values. Areas with preserved historical agricultural land use, respectively with preserved elements of historical agricultural structure are precisely this specific type of landscape in Slovakia.

Conclusion

The town of Čadca and its dispersed settlement came to existence as a result of herdsmen colonization. This colonization, determined by specific historical and socio-economic circumstances had also its spatial manifestation. The previously uninhabited forest landscape was penetrated by enclaves of agricultural arable-meadow landscape, usually with dispersed rural residences – dispersed settlements. However, this movement was under a significant "spatial control" of natural laws, so the first to be settled were the most accessible and

economically most favorable localities. The change of social and economic conditions is the reason for creation as well as for the extinction of this landscape. Transition to collectivized and mechanized socialist agriculture caused that many of these old, agriculturally used areas became irrelevant.

Due to the change of economic utilization (reduction or even liquidation of cattle and sheep) some areas of permanent grasslands remain unused. Ultimately, this trend allows the spreading of weed species of herbs and grasses, self-seeding of woody plants, secondary succession of the landscape. Sometimes it comes to disturbance of biodiversity and devastation of the landscape. There is a serious risk that in the foreseeable future it will come to irreversible decrease or even loss of biodiversity linked to these specific biotopes in this area, as a result of their abandonment and a subsequent rapidly advancing forest succession, or under the pressure of capital construction which decreases the diversity of the landscape, not respecting the biological and ecological values of the area. Dispersed settlement in the study area remained about the original form and shape. However, it does not fulfill its primary agricultural function. Even though the population of dispersed settlements is not decreasing, the self-supplying production function significantly declines. Cottagery becomes more prominent and it may be the impulse for the next development of the studied area. We significantly record the process of the transformation of houses into recreation cottages, new transitional residents are either descendants of original residents or people from cities looking for relax and recreation in this natural environment. The favorable localization in a tourist-attractive intact landscape, in a mosaic of meadows, pastures and forests gives rise to the increase of short-term recreation and subsequently the change of a housing stock. Positive element of this change is in a majority of cases preservation of the original architecture, what may positively influence the perception of this area also for future, prospective visitors.

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THE PROPOSAL OF PROCEDURE USED IN THE PROCESS OF ENVIRONMENTAL IMPACT ASSESSMENT FOR WATER MANAGEMENT

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Abstract
Economic, social and environmental change is inherent to development. The need to avoid adverse impacts and to ensure long term benefits led to the concept of sustainability. In order to predict environmental impacts of any development activity and to provide an opportunity to mitigate against negative impacts and enhance positive impacts, the environmental impact assessment (EIA) procedure was developed in the 1970s. Assessment of alternatives lies at the heart of the EIA process and methodology. A comparison of alternatives will help to determine the best method of achieving project objectives while minimising environmental impacts or, more creatively, indicate the most environmentally friendly or best practicable environmental option. Consideration of potential alternatives in the EIA process is one of the most critical elements of the scoping phase. The aim of this paper is assessing alternatives of selected construction by risk analysis method. The paper presents indicators for the assessment and classification the risk of the proposed new flood mitigation objects in terms of their possible negative impact on the environment. The calculation of the risk inherent in the proposed measures is applicable and directly available for selection of the optimal alternative of any flood protection objects in Kružlov village as part of initial screening in the EIA process.

Key words: flood protection objects, risk analysis, alternatives, likelihood, consequence

Introduction

Different development aspects are accompanying with many impacts on environment. In this way, different methods and techniques were used to create balance and suitability between human activities and environment. Environmental impact assessment (EIA) is useful method that it studies and assesses impacts of a project or plan on environmental factors [1]. Used in many countries, the aim of EIA is to reduce the environmental impact of a project at the earliest possible stage during the project cycle, that is, during the planning stage. EIA Directive (2011/92/EU) requires that certain developments be assessed for likely environmental effects (commonly known as environmental impact assessment) before planning permission can be granted.

Environmental assessment studies typically address a minimum of two alternatives, and they can include upwards of fifty alternatives. A two-alternatives study usually represents a choice between construction and operation of a project versus project non-approval. The alternatives to be addressed may encompass a wide range of considerations. There are different systematic methods which can be used for comparing and evaluating alternatives [2]. Following completion of all appropriate EIA studies, the major task is to make the completed analyses productive to the decision-making process. The evaluation of alternatives must result in a clear, concise comparison that easily illustrates the tradeoffs involved between the build and no-build alternatives and the distinguishing degree of impact among the various build or action alternatives [3].

Any project entails a set of activities over period of time, project activities occur either during the construction period or during the operations or in both periods. Such activities generate some stressors, which may have impacts on the environment. Types of environmental stressors typically include noise, air pollution, radiation, vibration, waste, etc. According the EIA legislation in Slovakia (24/2006 as amended by 408/2011) is needed to be done evaluation of the presumed impacts of the proposed activity on the environment including health and estimation of their importance. It is necessary to assess the:

- Impacts on population
- Impacts on the mineral environment, mineral raw materials, geodynamic phenomena and geomorphologic conditions.
- Impacts on climatic conditions
- Impacts on atmosphere
- Impacts on water conditions

- Impacts on soil
- Impacts on fauna and flora and their biotopes
- ***Impacts on landscape, structure and use of landscape, scenic aspects of the landscape.***
- Impacts on the protected areas and their protective zones
- Impacts on the territorial system of ecological stability.
- Impacts on the urban environment and land use.
- Impacts on cultural and historic monuments.
- Impacts on archaeological sites.
- Impacts on palaeontological sites and important geological localities.
- Impacts on cultural values of an intangible nature
- Other impacts.

The aim of this paper is to quantify the value of risk index for impact of flood mitigation measure stressor on landscape, structure and use of landscape, scenic aspects of the landscape.
The paper present methods relevant for the assessment of important stressors related to water constructions in EIA process.

Material and methods

The goal of this paper is to classify the impact of stressors to the environment by the risk index calculation. To accomplish this task was used Universal Matrix of Risk Analysis (UMRA) which has two phases [4]:

1. Verbal phase of the UMRA focuses on the identification of
   - vulnerable components of the environment,
   - stressors that threaten environmental components.

The result of this phase (Tab.1) is the initial matrix which is used in the numerical phase.

2. Numerical phase includes:
   - estimation the likelihood (probability),
   - determination the consequences,
   - calculation of the risk index for each stressor.

Both likelihood and consequence are expressed by qualitative measures using either descriptive words (description of impact) or quantitative measures (numerical values). The numerical phase focuses on the risk index calculation. Risk index (R_i) is a function of two key parameters: likelihood (L_i) and consequence (C_i)

$$R_i = L_i \times C_i \quad (1)$$

It is necessary to establish the parameters of the likelihood and consequences the impact of stressor for the determination of the risk index. A simple matrix of interactions of “stressors” and environmental “impact to...” is shown in Table 1. It presents impact of stressors to compounds of the environment (marked as ●).
Prerequisite for effective assessment of the potential impact of hydraulic structure to the environment is a set of criteria for determination the level of the likelihood and the consequence. Selection, arrangement and evaluation of the criteria in the final assessment are complex and time demanding process. Important prerequisite for the creation of purpose oriented set of criteria is the correct classification of each the numerical or verbal characteristics. Determination of these values is based on the standards, laws or literature, as well as subjective suggestions. All levels of likelihood and consequences at Table 2 and their characteristics were determined after reviewing scientific resources.
The combined likelihood-consequence levels could then be inserted in a risk matrix, see example of the risk matrix in Table 3. The lowest value of the risk factor may be 0,0625 (likelihood = 0,25; consequence = 0,25) and the highest is 1 for each impact of stressor. We have decided to use four distinct levels of risk: Low, Medium, Serious and High. Our risk level definitions are presented in Table 3. The risk value for each stressor impact is calculated as the product of consequence and likelihood values, illustrated in a two-dimensional matrix (Table 3). The shading of the matrix visualizes the different risk levels.
Based on the acceptance criteria, the risk level “High” is decided to be unacceptable. Any source of stressor impact at this risk level must be treated in order to have its risk reduced to an acceptable level.

Results

The proposal of this procedure using risk analysis method for determining the risk of flood mitigation object and choosing the best alternative of the activity is applied for flood protection object proposal in the village of Kružlov (Figure 1). Kružlov is a village and municipality in Bardejov District in the Prešov Region in north-east Slovakia. It is located in the Ondavská highlands on Slatvinec stream. This stream is a constant threat of flooding in the village. It is necessary drainage the area as care and protection of the environment and people.

Tab. 1: Identification of impact stressors to the environment

Impact on / **Stressor**	population	rock environment, minerals, geodynamic phenomena	climatic conditions	atmosphere	water ratios	land	fauna, flora and their habitats	country - the structure and land use, landscape	protected areas and their buffer zones	territorial system of ecological stability	urban complex and use of land	cultural and historical monuments, cultural values of incorporeal character	archaeological and paleontological sites and important geological sites	other
Emission	●		●	●			●		●	●	●			
Floods	●				●	●	●	●1	●	●	●	●	●	
Drought			●		●	●	●							
Sediments	●	●			●	●	●	●2					●	
Pollutions in water	●	●			●		●		●					
Erosion			●		●	●		●3						
Landslides	●	●			●	●	●	●4	●		●	●	●	
Pollutions in soil	●				●	●								
Noise	●						●	●5	●					
Vibration	●	●								●				
Waste	●				●	●	●		●	●				
Radiation	●						●		●	●				

The purpose of the proposed action is to regulate runoff conditions in order to improve flood protection in the vicinity of the flow. Proposed alternatives for proposed activity "flood protection object" in Kružlov village are:

- Alternative 0: stream bed will not be regulated – the current situation,
- Alternative I: stream bed will be regulated for Q_{100},
- Alternative II: construction of a polder and stabilization of the stream bed

Relevant stressors, which have impact on the country - the structure and land use, landscape is in Table 4 evaluated using data from [10] as well as our own calculations.

The table shows the calculations of risk index (R_i) for three alternatives of flood protection objects using risk analysis. The numerical result of each calculation is known as the risk index (R_i). This index is used to compare different alternatives and to prioritize the alternative which has the lowest risk index value.

Tab. 2: Criteria of likelihood and consequences

Stressor: Floods	Impact on country - the structure and land use, landscape			
	Likelihood „ L_i “	Local potential for flooding (-); (see [5])	Consequence „ C_i “	Changes in the country (-)
	0,25	low	0,25	very little or little altered landscape; positive or very positive perception element of landscape structure
	0,50	medium	0,50	moderately altered landscape; neither positive nor negative perception element of landscape structure
	0,75	high	0,75	significantly altered landscape; negative perception element of landscape structure
	1	very high	1	very significantly altered landscape; very negative perception element of landscape structure
Stressor: Sediments	Impact on country - the structure and land use, landscape			
	Likelihood „ L_i “	Environmental risk index (-); (see [6])	Consequence „ C_i “	Visibility water (-)
	0,25	(-)	0,25	highly transparent
	0,50	low, <1.1	0,50	more transparent
	0,75	medium, 1.1 to 3.0	0,75	rather opaque
	1	high, 3.1 to 5.0	1	highly opaque
Stressor: Erosion	Impact on country - the structure and land use, landscape			
	Likelihood „ L_i “	Categories of potential water erosion (-); (see [7])	Consequence „ C_i “	Intervention in the country (-)
	0,25	1.	0,25	no
	0,50	2.	0,50	weak
	0,75	3.	0,75	moderate
	1	4.	1	strong
Stressor: Landslides	Impact on country - the structure and land use, landscape			
	Likelihood „ L_i “	Tendency of areas to slope deformation (-); (see [8])	Consequence „ C_i “	Rating the visual impact (-)
	0,25	region of stable area	0,25	intrusive
	0,50	-	0,50	slightly disturbing
	0,75	region potentially unstable areas	0,75	moderately disturbing
	1	region of unstable areas	1	highly disruptive
Stressor: Noise	Impact on country - the structure and land use, landscape			
	Likelihood „ L_i “	Landscape types (-); (see [9])	Consequence „ C_i “	Estimated construction time (month)
	0,25	settlement	0,25	0
	0,50	agricultural	0,50	1-10
	0,75	agro-forestry	0,75	11-15
	1	forest	1	≥ 16

Tab. 3: An example of the risk matrix

	Level of consequences „ C_i “			
Level of likelihood „ L_i “	0,25	0,50	0,75	1
0,25	0,0625	0,125	0,1875	0,25
0,50	0,125	0,25	0,375	0,50
0,75	0,1875	0,375	0,5625	0,75
1	0,25	0,50	0,75	1

Risk categories				
	Low	Medium	Serious	High

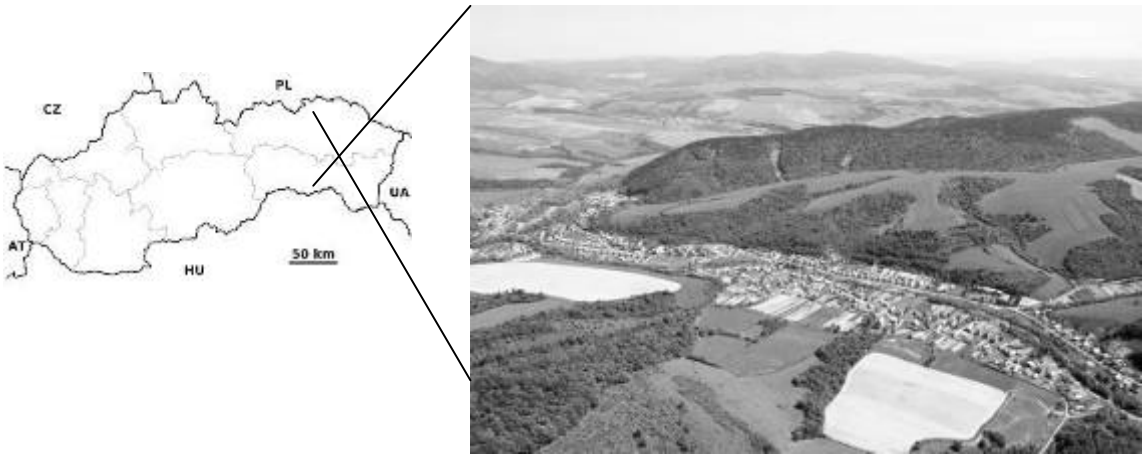

Fig. 1: Localisation of Kružlov village in the Slovak republic

Tab. 4: Evaluation of impact to country - the structure and land use, landscape

ID	Alternative 0			Alternative I			Alternative II		
	L_i	C_i	R_i	L_i	C_i	R_i	L_i	C_i	R_i
1	0,5	0,75	0,375	0,5	0,25	0,125	0,5	0,25	0,125
2	0,25	0,75	0,1875	0,25	0,25	0,0625	0,25	0,5	0,125
3	1	0,25	0,25	1	0,5	0,5	1	0,5	0,5
4	0,75	0,25	0,1875	0,75	0,5	0,375	0,75	0,5	0,375
5	0,75	0,25	0,1875	0,75	0,5	0,375	0,75	0,75	0,5625
			Σ 1,1875			Σ 1,4375			Σ 1,6875

The obtained results (Table 4) represent the overall state of risk index (R_i) for the environment from different stressor and their impact to the country - the structure and land use, landscape in assessing flood protection object for regulating Slatvinec stream in Kružlov village (Slovakia) by application of the risk analysis.

Discussion

Totally five stressors and their impacts on the country - the structure and land use, landscape were evaluated. Three alternatives were assessed. These five impacts of stressors have different values of risk index (R_i). According Table 4, the level of risk (ΣR_i) for alternative 0 is 1,1875, for alternative I is 1,4375 and for alternative II is 1,6875. This value is magnitude of the impact to the country - the structure and land use, landscape of proposal project (flood mitigation measures) in Kružlov village. This procedure can be applied for other stressors and their impact to environment according Table 1 could be assessed.

Conclusion

Certain developments must be assessed for likely environmental effects before planning permission can be granted. This paper provides a brief overview of the procedures involved in an EIA. The proposed assessment may be used in the process of comparing alternatives and the choice of optimum alternative for the purposes of environmental impact assessment of hydraulic structures. Application of the calculations for Slatvinec stream in the village Kružlov revealed that Alternative 0, Alternative I and Alternative II have different levels of risk for acceptability and achieve different risk index values. Alternative 0 has the lowest value of risk index. It means that no activity of flood protection in the village proves the lowest risk on landscape. Although it is necessary to evaluate all stressors within environmental impact assessment process before the activity proposal is approved.

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THE VALIDATION OF THE RESULTS OF MONITORING OF TOURIST TRAFFIC ON THE EXAMPLE OF SELECTED HIKING TRAILS IN THE NATIONAL PARK KRKONOSE (CZECHIA)

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Abstract
The issue of dealing objective capacity and throughput of landscape is a particular problem in recent years. It always depends not only on the area of interest which is, but also what the landscape will bring to the area and what it entails. Closely related to risk level for the protection of nature and landscape. The objectivity of the evaluation depends on the credibility of the data available, which have recently become increasingly acquired in automation systems for their collection. In two summer terms of 2012 territorial control was carried out investigation to verify the newly installed automated census stations on the routes near the top of Lysa Hora in the Krkonose. The resulting data were compared with the result that in some cases are perceptible differences.

Key words: Ecotourism, protected areas, destination capacity, throughput landscape, Biosphere Reserve, Krkonose

Introduction

The tourism has on the environment, whether adverse or positive impacts (Vehbi et Doratli, 2010). The need to preserve the most precious natural and cultural heritage led to the establishment of national parks around the world. Tourism in these areas with valuable natural and attractive characteristics may contribute to the protection, conservation and restoration of biodiversity and the sustainable use of natural resources in them (Sunlu, 2003). Excessive tourism but also brings a number of risks to the environment and nature (Ogarlaci et Popa, 2011), if hiking is its negative impact trampling especially when people over-use the same route, trampling the new path, or act their way out of depress on vegetation and soil, which will eventually cause damage (Sunlu, 2003). According to Liu et al. (2012) is one of the solutions for the development of protected areas-friendly tourism, which has the potential to improve the overall global biodiversity. Definition of sustainable tourism is not yet precisely defined and binding, of which involved the fact that research in this area is still in its infancy (Angelkova et al. 2012). At present, there is general agreement on the need for planning of tourism based on the principles of sustainability (Blancas et al. 2011), while stressing the need for long-term monitoring of the effects of tourism on the environment (Rio Nunes 2012, Buckley 2012). Indicators such monitoring is necessary to define and quantify, to the most limited personality assessment (Blancas et al., 2011, Hunter and Shaw 2007). One method of quantifying the impact of anthropogenic activities in protected areas is traffic monitoring protected areas. In the Krkonose National Park (and in this the highest Czech mountains Krkonose named Biosphere Reserve) n the past have been several monitoring studies (Cihar et al., 2000; KOLPRON, 2002; KOLPRON, 2005; Bartos et Cihar, 2010), which currently builds modern investigation method of electronic attendance monitoring devices using Eco-counter, operates using a pyroelectric sensor, which records the infrared radiation of the human body (Partnership Foundation, 2012). This comparative study presents preliminary results of the last monitoring conducted near the top of Lysa hora Mt. at tlen of Rokytnice above Jizera. There is area between 1st and 2nd zone of the National park, that the border areas in which we consider the most stringent regulation of the movement of tourists in order of protect nature.

Materials and methods

Quantitative monitoring

The census visitors used a precise and reliable method of direct observation. Using this standard method allows extremely easy comparability of results with other data from analogous studies (Bartos et Cihar, 2010). During the investigation, the recordings of all tourists collectively, distinguished by the movement of tourists towards east / west and phonetically and questions were verified nationality of tourists (the last figure, however, this assessment is not included). The research was conducted in two weekly monitoring in place from the 2nd to 8th August 2012 and from 16th to 22nd August 2012, daily from 9 to 17 hours (with

the exception of very bad mountain weather - measurement was interrupted for a few hours - traffic is not expected).

Locations of monitoring

The sites of quantitative monitoring are located in the Krkonose National Park (KRNAP). Interest in monitoring the measuring traffic near Lysa hora Mt.. Three reference sites (Fig. 1) are located on the hiking routes in the interface 1st and 2nd zone of KRNAP. Year round, these three and other places monitored by automatic interrogators of Administration of National Park.

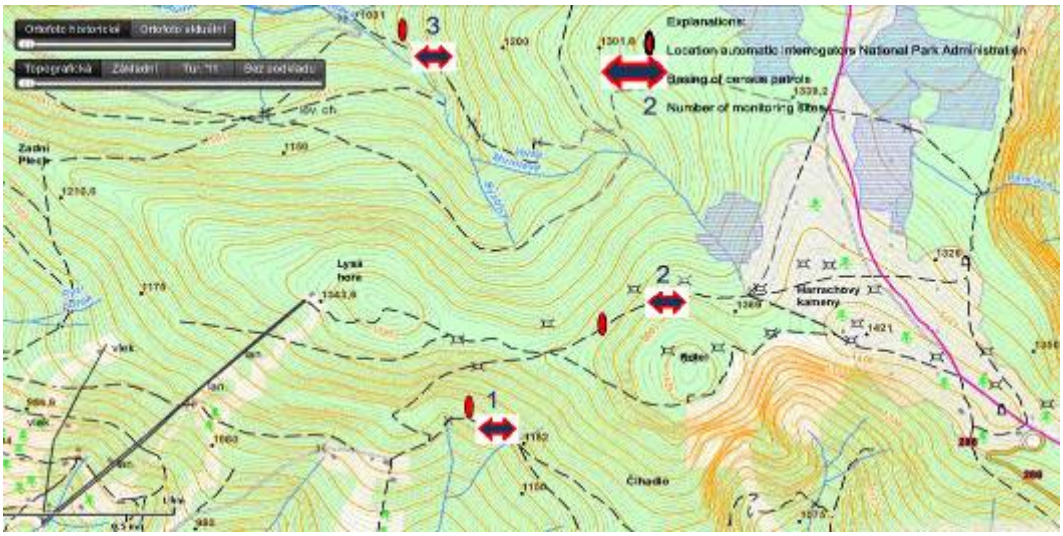

Fig. 1: Location of monitoring (Source: authors + KRNAP)

Three reference sites (Fig. 1)

- Habitat No. 1 "Krakonos's path“ (in Czech: „Krakonošova cesta“)
- Habitat No. 2 "Ruzenka's Garden" (in Czech: „Růženčina zahrádka“)
- Habitat No. 3 "Krakonos's Breakfest (in Czech: „Krakonošova snídaně“)

Results and discussion:

For this comparative study, the overall results of monitoring (Houdek et Marsalek, 2012) collected the following characteristics:

*0 The maximum daily number of visitors (date; number of tourists)
*1 The maximum hourly number of visitors (date; time; number of tourists)
*2 Distribution of visitors after days (%)

The short discussion compares the results of our monitoring of traffic with the results of automated counting.

Habitat No. 1 "Krakonos's path“

The maximum daily number of visitors:

- own monitoring (results of research) found: 4th August; 273 tourists
- KRNAP (Eco-counter results) indicates: 4th August; 319 tourists

The maximum hourly number of visitors:

- own monitoring (results of research) found: 2th August; 13-14a.m.; 64 tourists
- KRNAP (Eco-counter results) indicates: 4th August; 13-14a.m.; 74 tourists

Distribution of visitors after days (%) compares Fig. 2.

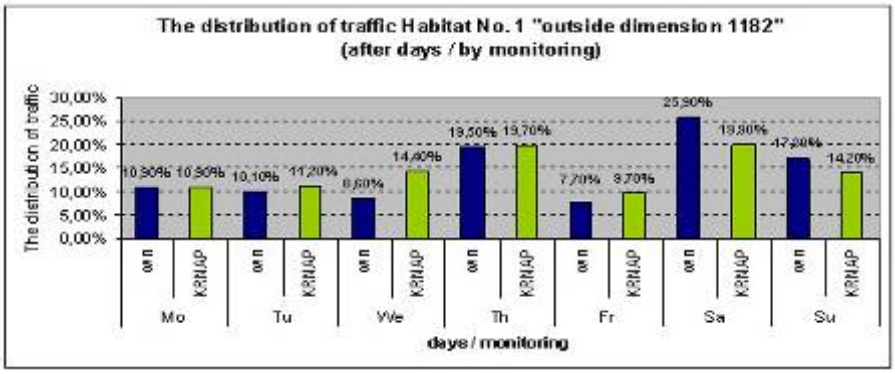

Fig. 2: Location of monitoring (Source: authors + KRNAP)

Habitat No. 2 "Ruzenka's Garden"
The maximum daily number of visitors:
- own monitoring (results of research) found: 18th August; 705 tourists
- KRNAP (Eco-counter results) indicates: 18th August; 528 tourists

The maximum hourly number of visitors:
- own monitoring (results of research) found:18th August; 14-15a.m.; 170 tourists
- KRNAP (Eco-counter results) indicates: 18th August; 14-15a.m.; 127 tourists

Distribution of visitors after days (%) compares Fig. 3.

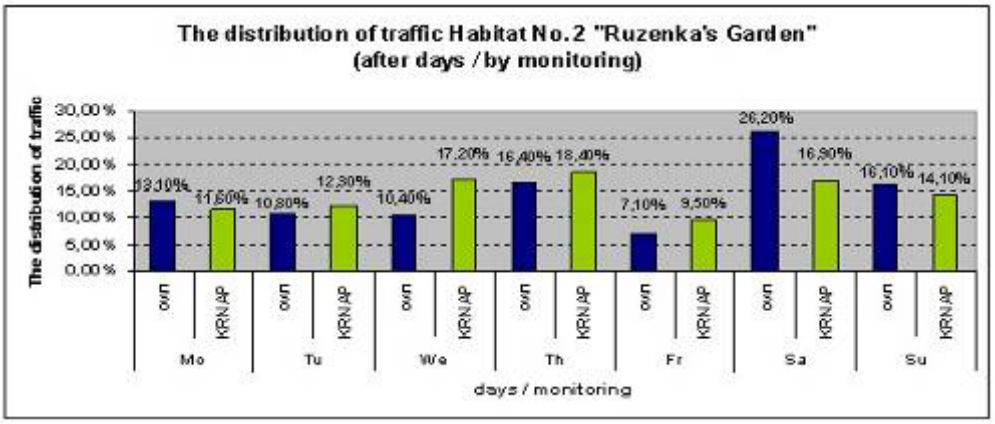

Fig. 3: Location of monitoring (Source: authors + KRNAP)

Habitat No. 3 "Krakonos's Breakfest
The maximum daily number of visitors:
- own monitoring (results of research) found: 18th August; 228 tourists
- KRNAP (Eco-counter results) indicates: 16th August; 227 tourists

The maximum hourly number of visitors:
- own monitoring (results of research) found:18th August; 13-14a.m.; 55 tourists
- KRNAP (Eco-counter results) indicates:16th August; 14-15a.m.; 49 tourists

Distribution of visitors after days (%)is compared Fig. 4.

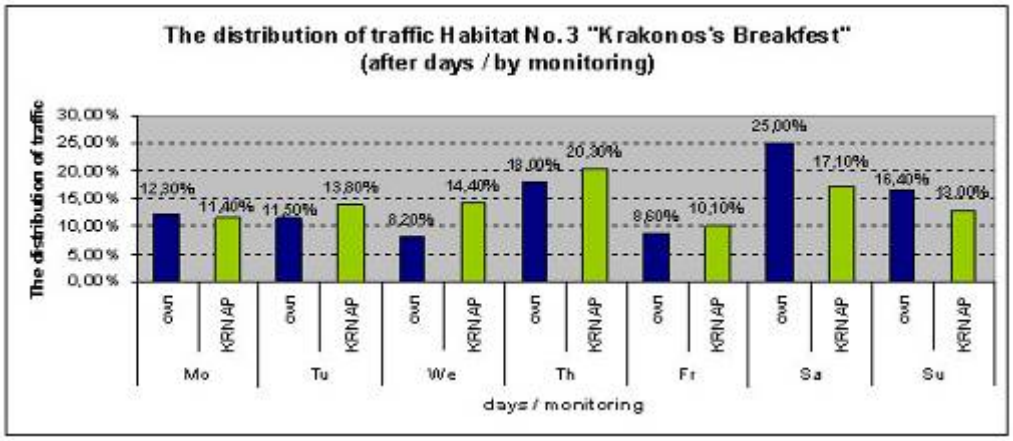

Fig. 4: Location of monitoring (Source: authors + KRNAP)

On each of the three habitats occurred during monitoring of the different results of comparative counting tourists. If we assume that the results of the direct quantitative counting error rates are not affected (or minimum), and in particular the maximum value of auto-aggregation, which is lower than the result of research, is striking. It can only explain a large group of tourists, the automatic counting fails to correctly capture. It follows that the automatic counting in similar cases underestimates the number of tourists. Otherwise, if a tourist pass clocks around several times, the times recorded. Comparison of distribution of visitors each day has in both cases based on comparably. Reviewed by Manufacturer - +5% error of your device and the minimum is exceeded in cases that could be attributed to variations in the intensity of research time. The results of both methods is to be subjected to deeper analysis - statistical comparison of the other values in the different periods of time and to check whether there is or there is a higher percentage differences than the guaranteed value.

Conclusions

Partial results of comparative research revealed some differences between the direct method of counting tourists and automatic counting. In today's technological progress is the automation necessary economic necessity, but it must be continuously conquering human control. It is for the benefit of itself improve automated system to verify the accuracy of the reported data and in this case to determine the extent feasible destination capacity in protected areas and the development of ecotourism in Krkonose.

Summary

The issue of dealing objective capacity and throughput of landscape is a particular problem in recent years. It always depends not only on the area of interest which is, but also what the landscape will bring to the area and what it entails. Closely related to risk level for the protection of nature and landscape. The objectivity of the evaluation depends on the credibility of the data available, which have recently become increasingly acquired in automation systems for their collection. In two summer terms of 2012 territorial control was carried out investigation to verify the newly installed automated census stations on the routes near the top of Lysa Hora in the Krkonose. Own research was conducted in two weekly monitoring on trhee localitations from the 2nd to 8th August 2012 and from 16th to 22nd August 2012, daily from 9 to 17 hours Partial results of comparative research revealed some differences between the direct Metod of counting tourists and automatic counting. The results of both methods is to be subjected to deeper analysis - statistical comparison. Determination of the extent feasible destination capacity in this area will bring the future development of ecotourism in the National Park Krkonoše, which this year celebrates 50th Anniversary.

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TORRENT AS AN IMPORTANT COMPONENT OF RECREATIONAL AND TOURISTIC POTENTIAL OF THE LANDSCAPE

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Abstract
The report deals with the importance of torrents in connection with recreational and touristic potential of the landscape. With the example of torrent Jelenec in Veľká Fatra National Park (Central Slovakia) is through educational – ecotouristic polygon explained irrecoverable importance of torrents for man and the landscape. The visitors will be recognized with basic information and knowledge about characteristics of torrents and their watersheds, positive and negative importance of torrents, singularity and specifics of torrent ecosystems, flash floods, torrent erosion, nature near torrent control, individual design elements of torrent control, riparian stands, measures in torrent watersheds, revitalization of torrents, torrent watersheds management etc. The knowledge will be presented on 12 proposed stands with informative boards. The proposed polygon has a lenght of 4,090 km (one direction), of 8,180 km (there and back), respectively. The route is intended for general public and can be used as a means of holistic education for students in various levels and forms of study with focusing on nature, landscape and environment protection, landscape ecology, landscape engineering, protection of water sources, flood and erosion control etc.

Keywords: ecotourism, protected areas, water flows

Introduction

Torrents are strikingly valuable and very important component part of the landscape with a great recreational and touristic potential. With they unique characteristics and specifics they create irrecoverable ecological, environmental, aesthetic and life-giving value of the landscape. All of the torrents in the Slovak Republic (24.000 km) occur in the large-plane protected areas (national parks, landscape protected areas). The torrents are located in the highest parts of the watersheds in national parks and protedced landscape areas which are often popular tourist sites.

A man perceive the torrents from two views. On the one hand are the torrent very useful as a source of quality drinking water etc. and on the other hand they can be harmfull after neglecting attendance and cause the flash floods and erosion processes.

The aim of this paper is the proposal of recreational – ecotouristic polygon which is focused at importance of torrents for man and the landscape. The possibilities of flash flood and erosion protection of the landscape are documented as an example of the nature near torrent control Jelenec. The tourists, university students and general public, too can be to acquaint with the technical and biological activities of foresters in the landscape protection through forestry ameliorations and landscape engineering.

Torrent control and watershed Jelenec

The torrent control Jelenec in Veľká Fatra National Park was built in 1926-1927 according to project of prof. Dr. Leo Skatula (1889-1974) which was a founder of torrent control activities (1923) on the territory of the Slovak Republic. Prof. Skatula later (1945 - 1961) worked at the Faculty of Forestry of the University College of Agriculture in Brno. This torrent control serves well to its purpose until now and can be a pattern for contemporaty designers in many ways. Total lenght of torrent control Jelenec is of 3,265 km. In this torrent control we can see various interesting technical and biological measures in connection with flood and erosion control of the protected landscape (Fig. 1, Fig. 2 & Fig. 3). The watershed area of torrent Jelenec is of 9,60 km^2. The absolute height difference in the watershed is 950 m. The total lenght of the torrent Jelenec is 5,5 km. The torrent rises in altitude of 1400 m a. s. l. The mean altitude of the watershed is 930 m a. s. l.

Fig.1 Sills in the torrent control Jelenec

Fig. 2 Dam in the torrent control Jelenec

Fig.3 Weir carved in the rock in the torrent control Jelenec

Proposal of the recreational – ecotouristic polygon

There are proposed 12 stands with information boards on the route of the polygon (Table 1). The visitors will be recognized with basic information and knowledge about characteristics of torrents and their watershed, positive and negative importance of torrents, singularity and specifics of torrent ecosystems, flash floods, torrent erosion, nature near torrent control, individual design elements of torrent control, riparian stands, measures in torrent watersheds, revitalization of torrents, torrent watersheds management etc. The information will be given on proposed stands. Proposed polygon is 4,090 km long in one direction and bidirectional of 8,180 km. The absolute height difference of the route is 285 m. The weighted arithmetic mean of longutudinal gradient of the route is 8,36 %.

The topics of individual stands

On individual stands are these professional topics proposed:

1. Torrent and watershed Jelenec in Veľká Fatra National Park
1.1 National Park and Protected water management area Veľká Fatra
1.2 Torrent and watershed Jelenec - basic characteristics
1.3 Importance of torrents, singularity and specifics of torrent ecosystems
1.4 Torrent as a resource of drinking water
1.5 Harmfulness of the torrents

2. Flash floods in torrent watersheds
2.1 Causes, formation and process of flash floods
2.2 Flood and breaktrough wave
2.3 Biotechnical and technical flood control
2.4 Flood control in the watershed
2.5 Flood control in the torrent beds

3. Torrent erosion
3.1 Formation, sources and characteristics of the sediments
3.2 Sediments transport dynamic
3.3 Scour and sedimentation of the bed
3.4 Taking of sediments
3.5 Grain size parameters

4. Torrent control
4.1 Foresters and history of torrent control on the territory of Slovakia
4.2 Fundaments of torrent control
4.3 Degree of natural steady-state of torrent bed
4.4 Determination of extent of torrent control
4.5 Determination of method of torrent control

5. Proposal of direction of the route
5.1 The principles of proposal of direction of the route
5.2 The proposal of operation polygon and tops of the route
5.3 Simple and composite circular arcs
5.4 Proposal of straight sections
5.5 Arcs with gradual change of curvature

6. Proposal of longitudinal gradient of nivelette
6.1 Principles of proposal of nivelette
6.2 Principles of gradation of the bottom
6.3 Equilibrium bed slope
6.4 Natural sills and weirs
6.5 Proposal of fishways

7. Transversal objects in torrent control
7.1 Submerget sills
7.2 Sills
7.3 Weirs
7.4 Rough boulder ramps and waste gates
7.5 Polders and dams

8. Longitudinal reinforcements of torrents
8.1 Vegetal reinforcements
8.2 Non-vegetal reinforcements
8.3 Combined reinforcements
8.4 Non-ecological and undesirable reinforcements
8.5 Longitudinal reinforcements in build-up areas

9. Proposal of flow profile
9.1 Principles of dimensioning of flow profile
9.2 Degrees of protection of objects and cultures
9.3 Capacity of flow profile
9.4 Shape of flow profile
9.5 Simple and composite profiles

10. Riparian stands of the torrents
10.1 Distribution, estabilishment and tending about riparian stands
10.2 Tree species of riparian stands and their ecological requirements
10.3 Ecological functions of riparian stands

10.4 Environmental functions of riparian stands
10.5 Produce functions of riparian stands

11. Measures in watershed in protected areas
11.1 Integrated torrent-watershed management
11.2 Transformation of surface runoff to subsurface
11.3 Control of soil compaction, erosion and drainage systems on unpaved forest roads and lines
11.4 Attendance about wild (natural) torrents
11.5 Forest ameliorations in small watershed

12. Revitalization of torrents
12.1 Principles of design of revitalization of torrents
12.2 Revitalization of improperly constructed torrent control
12.3 Revitalization of non-controled torrents
12.4 Revitalization of torrents with polluted water
12.5 Fauna in revitalized torrents

Tab. 1: Characteristics of the polygon

Stand	Stat. (km)	Altitude (m a.s.l)	Topic of the stand	Distance (m)	Ø Grad. (%)	Surface of route
Beg.	0.000	590	--	-	-	-
1	0.150	592	Torrent and watershed Jelenec in Veľká Fatra National Park	150	1.33	Bitumen road
2	0.550	598	Flash floods in torrent watersheds	400	1.50	
3	1.300	621	Torrent erosion	750	3.07	
4	1.375	625	Torrent control	75	5.33	
5	1.550	635	Proposal of direction of the route	175	5.71	
6	2.010	650	Proposal of longitudinal gradient of nivelette	635	2.36	
7	2.300	678	Transverse objects in torrent control	290	9.66	
8	2.705	700	Longitudinal reinforcements of torrents	405	5.43	
9	3.000	725	Proposal of flow profile	295	8.47	
10	3.200	745	Riparian stands of torrents	200	10.00	
11	3.325	770	Revitalization of torrents	125	20.00	
12	4.090	875	Measures in torrent watershed	765	13.33	Unpaved path
				--	--	--

Conclusion

The torrent control Jelenec which was buildt in 1926-1927 is a very good example of utilization recreational and touristic potential of the landscape in Veľka Fatra National Park. Existing road provides a good acces to these interesting localities without damage to the surrounding protected natural environment.

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WIND FARMS AND TOURISM IN THE ROMANIAN BANAT

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Abstract
The Romanian Banat region in Romania is a region where the original Czech community has been living since 1823. This tourist area is very interesting, because there are people living like in the old days. There are six Czech villages still inhabited by descendants of Czech immigrants, who can still speak Czech. These are: Saint Helena, Gernik, Rovensko, Bigr, Šumice and Eibentál.
This site is very interesting for the Banat magnificent mountainous landscape and the way of life.
Enel began to build a total of 21 wind farms around the Sfanta Helena in 2011. In the village there is no place where the rotating wind power stations cannot be seen. Villagers now have considerable income from tourism and constructions pose a danger to this earning. How will the situation develop?

Key words: Landscape, tourism, environmental impact

This paper is concerned with the question of sustainable or unsustainable life and tourism in a chosen case study from a specific setting of a Czech village Sfanta Elena (Svatá Helena) in the Romanian Banat region. This very interesting area has come through a highly dynamic change during the last 20 years, which has brought a revaluation of life attitudes and schemes of the local community having been formed for almost 200 years. Sfanta Elena is not the only Czech village in this region. But it is interesting for us, because company Enel began to build a total of 21 wind farms around the Sfanta Helena in 2011. The construction of the wind power plants has changed the landscape. Before the construction of the wind plants, the source of livelihood of the locals was tourism. What impact will the construction have on the life of local residents who made their living from tourism and recreation?

Fig. 1: Building plan of wind power plants in the surroundings of Sfanta Elena
(Zdroj: http://www.banat.cz/images/vetrne_elektrarny/FIK_0760.jpg)

Wind power plants round Sfanta Elena started not only environmental changes but they also influenced the landscape appearance and land cover. New wide roads and base circles of the poles were created in the place of fields, meadows and pastures.

Now there are 21 wind turbines with the capacity of 3 MW each and often 140 m in height, operated by Enel Green Power Romania Company, a subsidiary of the Italian Enel Group. Nine generators are located in the municipal pastures. The company did not succeed in buying these pieces of land thanks to a Czech representative's opposition in the municipal council. The company is thus bound by a lease contract, from which an obligation to contribute to the municipal budget by a sum of 2,500 Euro for each of the 9 generators follows. The other generators stand on private pieces of land which were sold by the villagers for relatively low prices (starting at 400 Euro per hectare) [11]. There is a big risk that the constructions will negatively influence the developing potential of tourism and intact landscape of the Iron Gate Nature Park and the protected areas of NATURA 2000. The construction of wind turbines brings not only a significant change of the local landscape and destruction of the landscape character, but also an impact on the local community. This involves the erection of poles with the turbines, as well as the construction of consolidated wide roads for heavy mechanisation, which sharply contrast with the usual field paths (fig. 2). Such roads represent a massive appropriation of agricultural land and have impacts on perception and "reading" of the landscape. On the other hand, the building of wind turbines in the surroundings of the village created a few job opportunities. Concerning the fact that the building of wind power plants is finishing only in these days, it is not clear yet, what this massive change will bring next and if the decline of the tourism potential or directly the quality of life of the local population will come. Their attitude to the wind power plants is ambivalent, they perceive them through the perspective of Czech tourists and the biggest risk for them is a potential loss of their income from tourism [9].

Fig. 2: Landscape

Amongst other things, the construction of power plants certainly has a great influence on the environmental change. As demonstrated by the study of other areas where the construction is completed, the negative effects of power plants are many. In the investigated area, the biggest problem is a change in hydric conditions (Fig. 3). Already from a lay perspective, we can see that broad paths are ideal for a quick drainage of water and in areas such as karst they can have fatal consequences.

Fig. 3: Change in hydric conditions

Another problem is the loading and filled in sinkholes that have dramatically changed the landscape. Wind turbines have inter alia a large impact on the fauna and not only avifauna but also bats. The problem was addressed by the conference Eurobats Bratilava in the Slovak Republic in 2005, where also studies concerning the number of deaths of bats who did not die as a result of a collision with a wind power plant, but only when passing close to it were presented. They suffer from the divers' disease when a propeller rotating nearby creates a vacuum which becomes mortal for the bats. 92% of them die from internal bleeding, which is caused by just this vacuum and not by a conflict with the propeller [12]. The mortality study of bats was made by scientists from the Canadian University in Calgary. This phenomenon is officially called decompression sickness and is described well by divers – it comes when the organism cannot cope with the rapid emergence of the sharp drop in ambient pressure. A similar effect on avifauna and bats can therefore be expected around Sfanta Elena. For example, in the wind park Tarifa in Spain 48 griffon vultures were killed in 1998 [12]. A wind farm in West Virginia in the U.S. killed approximately 4,000 bats – 7 kinds of bats in the first year of operation [12]. The influence of wind power plants on nature and the landscape is known relatively little as well as the impact on the microclimate. Anyway, many previous studies have shown negative effects: on the fauna and flora, but also on the landscape. The impact, of course, will also hit tourism. At present, the impact appears positive so far when people go to Sfanta Elena to see what it looks like after the construction, but considering the examples from abroad, we can expect a decline in tourism. There are of course exceptions. In Germany when a wind park was built, the amount of cycle paths increased significantly as well as the tourist traffic. However, only future will show what impact this phenomenon will have on Sfanta Elena and its surroundings.

Conclusions

The traditional way of life of the rural community in Sfanta Elena has been preserved to a higher extent than it is usual in the Central European area these days. That is given mainly by a bigger isolation of the population from its surroundings (isolation given by natural environment and ethnical and religious difference). Nevertheless, it is affected by new influences such as an introduction of technical conveniences in the households and in the husbandry, tourism, more frequent contact with the surroundings, which is caused by the development of infrastructure and the youngest generation leaving for towns and cities in Romania or the Czech Republic. The main reason for leaving is a lack of job opportunities in the area. In Sfanta Elena a general idea persists that there must be a better life in the Czech Republic, because there is enough work and money there. The village is at risk of decline in case all young people decide to move out and it is unsuccessful in maintaining the developing tourism potential that has been disturbed at least by the construction of wind power plants. Today, rather negative effects of this construction have been shown in the very surroundings of Sfanta Elena.

From the perspective of the local community, this project has some important negative drawbacks that consist in a significant disturbance to the landscape character and thus in a further weakening of the connection of the people to their landscape.

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