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STRUCTURE OF THE NATURAL ENVIRONMENT AND THE SPATIAL MANAGEMENT PLAN OF THE VILLAGE TRZEBUNIA IN THE ŚREDNI BESKID MTS

Abstract: The article presents the structure of the natural environment of a village (its surface 23,8 sq.km) on the basis of the results of a detailed physical-geographical mapping and of multi-annual observations of the state and changes of the environment. The described spatial arrangement of geocomplexes reflects relationships among particular components of the natural environment and these between man and the environment. These served to assess the spatial management plan of that part of the gmina of Pcim

Key words: spatial management plan, structure of the natural environment.

The aim and the method

The aim of the paper is to present the natural environment structure and to assess the spatial management plan of the gmina of Pcim (*Plan...* 1990) in its part relating to the village of Trzebusia. The structure of the natural environment was described in a master thesis (Ostafin 2003) prepared under the leadership of W. Ziąja. On the basis of physical-geographical mapping by the method of Z. Czeppe and K. German (1978) types of geocomplexes were distinguished. The principal criterion for the typology was relief, since in the mountain environment it is an exponent of the differentiation of its whole (Starkel 1972). The knowledge of fundamental features of the geocomplexes and of natural conditionings of various land use forms makes it possible to assess the conformity of the plan with environmental conditions.

Area of research

Trzebuń is situated in the north-eastern part of the Średni Beskid Mts. It covers 23.8 sq. km in the south of the Myślenice district, gmina of Peim, between two parallel ranges, the lower northern one (up to 727 m a.s.l.) represented by the ranges of Sularzówka and Trzebuńska Mount and the higher southern one (up to 857 m a.s.l.) of the range of Kotoń in the valley of the Trzebuńka.

Structure of the natural environment

As a result of physical-geographical mapping 638 individual geocomplexes in the rank of uroczyskos were separated, which were grouped into 21 types of uroczysko units (Fig. 1, Tab. 1).

The most important features of the environmental structure are;

- numerical and surface co-dominance of the types of uroczyskos of medium-inclined slopes, 10-15°, and of gentle slopes, 6-10°, intersected by numerous V-shaped valleys,
- high diversification of the number of uroczyskos in uroczysko types (from 1 in the uroczysko type of alluvial cones to 134 in the uroczysko type of medium-inclined slopes, 10-15°),
- high diversification of the surface of uroczysko types (from 0.023 sq. km in the uroczysko type of alluvial cones to 7.767 sq. km in the uroczysko type of medium-inclined slopes, 10-15°),
- quantity-quality differentiation of uroczysko types dependent on landforms, which reflects the properties of bedrock and the stages of environment evolution. On very resistant rocks – the Magura and Ciężkowice strata, most frequent is the occurrence of uroczyskos of medium-inclined, steep, and very steep slopes and of V-shaped valleys,

Explanations to Tab. 1: No of types as in Fig. 1.: Relief: Sd – denudation flattenings, Ko – monadnock knolls, St – slopes, Os – landslides, Dn – trough-like valleys, W – V-shaped valleys, Dst – narrow terraced valleys, K – channel, T – terraces, Sn – alluvial cones - Lithology: Mg – Magura strata, In – Inoceramus strata, Pł – mottled shales, Hg – hieroglyphic strata, C – Ciężkowice strata, A – alluvia; Soil types: B – brown, M – alluvial soils; Waters: Gg – deep ground waters, Gp – shallow ground waters, Cs – permanent streams, Ce – episodic streams, Co – periodical streams, Wy – water outflows and seepages, P – waterlogged places, Z – springs; Dominant land use: L – forest, UR – arable land, Z – buildings, W – waters.

Objaśnienia do Tab. 1: Numery typów jak na Ryc 1., Rzeźba: Sd – spłaszczenia denudacyjne, Ko – kopy ostańcowe, St – stoki, Os – osuwiska, Dn – doliny nieckowate, W – wciosisy, Dst – wąskie doliny sterasowane, K – koryto, T – terasy, Sn – stożki napływowe- Litologia: Mg – warstwy magurskie, In – warstwy inoceramowe, Pł – pstry łupki, Hg – warstwy hieroglifowe, C – warstwy ciężkowickie, A – aluwia, Typy gleb: B – brunatne, M – mady, Wody: Gg – gruntowe głębokie, Gp – gruntowe płytkie, Cs – ciekі stałe, Ce – ciekі epizodyczne, Co – ciekі okresowe, Wy – wyciekі, wysięki, P – podmokłości, Z – źródła, Dominujące użytkowanie: L – las, UR – użytki rolne, Z – zabudowania, W – wody.

Tab. 1. The characteristic of the types of uroczysko

Tab. 1. Charakterystyka typów uroczysk.

Number of the type	Number of units in the type	Total surface [km ²]	Height a.s.l. (relative height dominant above valley bottom)	Relief	Dominant lithology	Dominant inclined	Water	Soil subgroup	Dominant land use
1	1	0,04	750-770 (405-420)	Sd	Mg	0-6°	Gg	B	L
2	9	0,43	590-728 (200-310)	Sd	Mg	0-6°	Gg	B	L
3	8	0,24	480-635 (120-190)	Sd	Mg	0-6°	Gg	B	L
4	10	0,54	410-580 (60-125)	Sd	In	0-6°	G	B	UR
5	7	0,28	380-493 (20-55)	Sd	In, Pt	0-6°	G	B	Z, UR
6	2	0,08	600-650	Ko	Mg	6-15°	Gg	B	L
7	98	6,46	370-760	St	In, Hg	6-10°	Cs, Ce, P	B	UR, Z
8	134	7,76	350-820	St	Mg	10-15°	Cs, Ce, P, Wy, Z	B	UR, L
9	80	3,88	360-850	St	Mg	15-20°	Cs, Ce, Wy, Z	B	L
10	29	1,72	360-779	St	Mg	20-35°	Cs, Ce, Z, Wy	B	L
11	26	0,82	390-720	Os	różna	0->35°	Ce, Wy, P, Z	B	L
12	13	0,12	382-560	Dn	Hg, In	6-10°	Ce, P	B	UR
13	21	0,07	377-760	D	various	6-15° (bottom) 15->35° (slopes)	Co, Wy	B	L
14	132	1,35	341-720	W	various	10-25° (bottom) 20->35° (slopes)	Cs, Z, Wy	B	L
15	3	0,14	370-450	Dst	C, In	3-6° (bottom) 10-20° (slopes)	Cs, Z, P	B, M	L, UR
16	3	0,17	341-500 (<1)	K, T	A, C	0-3°	Cs, P	M	L, W
17	27	0,41	342-503 (1,5-3,5)	T	A, C	0-6°	Gp, P, Z	M	L, UR
18	11	0,21	345-428 (3-7)	T	A, C	0-6°	Gp, P, Z	M	L, UR
19	19	0,21	350-487 (8-10)	T	Hg, C	0-6°	Gp, Wy	B	UR, Z
20	4	0,02	365-435 (11,5-19)	T	Hg, C, In	0-6°	Gp	B	Z, UR
21	1	0,02	364-375	Sn	A, C	0-6°	Gp, Cs	M	UR

On less resistant rocks- hieroglyphic, Inoceramus, mottled shales – uroczysko type of gentle slopes predominates. Stages of environmental evolution are reflected by the arrangement of uroczysko types of denudation flattenings and of terraces situated at varying heights:

- change of the dominating uroczysko types under the influence of height above sea level. On account of relative heights reaching 500 m a vertical change of the type arrangement is observed. The highest locations are represented by uroczysko types of denudation origin; flattenings of the Beskid level, the inner-mountain and of the foothill levels. The lower position is taken by uroczysko types of erosional and denudational origin; V-shaped valleys and dingles, trough-like valleys, low denudation flattenings and landslides. The lowest position is represented by uroczysko types of accumulation-erosion origin: terraces and the Trzebuńka channel,
- change of the dominating uroczysko types on the northern and southern side of the Trzebuńka valley. On the northern side a clear surface predominance (more than 20%) is represented by uroczysko types of ; denudation flattenings of the near-valley, foothill, and inner-mountain levels, and of dingles. On the northern side a clear surface prevalence (over 20%) over the northern side is revealed by uroczysko types of: denudational flattenings, very steep slopes, 20-35°, of the Pleistocene Riss terrace, and of landslides.

Spatial management plan

The plan was approved of by the Gmina Council of Pcim in 1990. It includes directions, principles and indices of functional-spatial development of the Gmina by 2004 and was a basis for investment location.

The most crucial functions deciding about the gmina's development include;

- agriculture represented by breeding-arable and horticultural production directions,
- forestry with forest cultivation and timber production,
- servicing of residential and temporary population,
- tourism and recreation.

On account of gmina's situation in a planned area of protected landscape and in a zone of intermediate protection zone of the water reservoir of Dobczyce, prohibition was adopted of introducing industry there except for plants servicing the agriculture and small craft.

Assessment of the general assumptions of the spatial management plan

The natural environment and the social-economic conditionings constrain the possibility of pointing to a main development direction. As far as Trzebunia is concerned the plan assumed implementation of agro-forest and tourist-recreational function.

The principal agents impeding the development of agriculture are ; high slope angles (some 40% of arable land is situated within uroczysko types of slope angles

above 10°), prevalence of brown leached and acid soils reckoned into 11 (grain-mountain) and 12 (mountain oat-potatoe) complex of agricultural usefulness, apart from the fragmentation and dispersion of plots (dominance of farms between 2 and 5 ha which cover 82.11 % of arable land). The breeding –cultivation direction proposed in the plan can be accepted on a scale of farms' own needs. The horticultural direction is more dependent on natural constraints resulting from a large surface of arable land in the type of mesoclimate of valley depressions to about 80 m above the valley floor, with frequent thermal inversions and the dominating share of northern exposures in the southern part of the valley. There are also social-economic barriers such as the lack of horticultural experience, a decreasing employment in agriculture or the fragmentation of plots.

Forests cover some 52% of the village surface, chiefly in uroczysko types of steep slopes (15-20°) and of very steep slopes (20-35°). More than 70% of the forests belong to private owners. The century-long intensive economy brought about changes in the species composition of the forest and of low average age of tree stands, some 50 years. According to the assumptions of the spatial management plan that function is regulated by forest services.

The implementation of the tourist and recreational function requires, apart from large capital expenditure, the solution of waste management problems and of sewage treatment. This relates chiefly to the Trzebuńka stream (among other things a designed bathing pool) with lower class (II-III) waters. Little attention is paid to the possibilities of using other resources of the environment.

The plan introduces recommendations useful for the structure of the environment, associated with the use of land, such as;

1. Ban on clear cutting.
2. Conversions of wet grounds into meadows.
3. Afforestation of the poorest grounds with high slopes, sodding of erosion-labile grounds. During field investigations the occurrence of agriculturally used uroczyskos of steep slopes (15-20°) was found, these require lying fallow because of the intensification of denudation processes (rainwash, sliding of agricultural terraces).
4. Lowering of agro-forestal boundary and afforestation. The process of re-naturalization of landscape, strengthened after 1989, relates chiefly to the type of uroczyskos of medium-steep slopes (10-15°). It makes it possible to constrain the denudation of mountain slopes, to reduce the circulation of water, and adds to the regeneration of soils and of natural vegetation. In 2003 the surface liable to forest succession amounted to 42 ha i.e. some 2% of the village surface (Ostafin 2003).
5. Conservation of riparian and field vegetation.
6. Conformity of the architecture with landscape and counteracting the dispersion of buildings. The harmony of the architecture with landscape is low. Building extension at Trzebuńka is concentrated in uroczysko types of gentle slopes (6-10°) and of higher terraces.

The assessment of detailed assumptions of the spatial management plan

On the basis of the spatial management plan it is possible to point to the following conflicts of its assumptions with the natural environment;

1. Introduction of buildings in uroczysko types of landslides and in their vicinity. The chief area of conflict relates to the upper part of the Trzebuńka catchment basin where in the vicinity of the buildings there are active landslides or areas liable to their origin. This can lead to building damage, because since 1997 fragments of the landslides have become active during summer months with heavy rainfall totals.
2. Introduction of buildings in uroczysko types of the lowest terrace levels. The main conflict field occurs in the central part of the village where the lowest terrace, 1-3 m high, is some 100 m wide and is built up. Despite intense deep erosion of the Trzebuńka (1-1,5 m on average during the past 50 years) a hazard of building damage occurs during high rises of water, with a high level of ground waters in the terraces leading to building wetting.
3. The designed waste landfill, 1 ha in surface, on the fissured, water-abundant Magura sandstones above the headwater zone and of water intake plants supplying three settlements. Such a location of the landfill can lead to pollution of waters and would require construction of a forest access road.

Apart from the mentioned fields of conflict the following faults were noticed in the plan;

1. Ill-traced administrative boundaries of the village to be seen in the map annex to the plan. The divergences from the boundary designated on cadastral maps 1: 2,000 amount to some 200-400m. They occur both in south-east, north-west and in the south of the village.
2. The planned nature reserve Kotoń does not cover the best-developed, some 100 years old communities of *Dentario glandulosae*-Fagetum. Instead, it is to include sub-ridge areas with a young fir-spruce forest and with a mixed forest. The location of the reserve should take into consideration a detailed nature inventory, especially phytosociological.
3. There is lack of criteria for the designation of roads and viewing panoramas and of tourist tracks. Their choice should be based on a methodical valuation of the natural environment.
4. Un-univocal descriptions relating to the natural environment e.g. "inclinations not excluding arable farming, pasture management should be obligatory on arable land as an optimum use of poor soils with high angles".

Conclusions

A large number of geocomplexes over a small surface makes it difficult to point to a dominating development function for the village of Trzebuńka. The combination in the plan of a few development possibilities of environmental management seems to be proper. Agriculture is best developing in uroczysko types of denudation flattenings

on the near-valley level and on gentle slopes of 6-10°. In most other uroczysko types, on account of high relief dynamics, the optimum use is forest. For the implementation of tourist-recreational function it is necessary to rapidly improve the water supply and sewage disposal system.

Detailed location decisions assumed in the spatial management plan require some correction. What is meant is the ban on building in geocomplexes of landslides and inundation terraces of the Trzebuńka. Objects arduous to the environment, protected areas and touristically attractive places, should be designated in consultation with specialists dealing with environmental components and landscape ecology.

The planners should, to a higher degree, take advantage of complex papers on natural values. This would make it possible, at the preliminary stage, to point to potential conflicts, to precise implementation requirements for an investment project, and to reasonably use environmental resources.

References

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Struktura środowiska przyrodniczego a plan zagospodarowania przestrzennego wsi Trzebuńka w Beskidzie Średnim

Streszczenie

Na podstawie badań terenowych wyróżniono 638 geokompleksów indywidualnych rangi uroczysk, które zgrupowano w 21 typów uroczysk (Ryc. 1, Tab. 1). Znajomość podstawowych cech typów geokompleksów i przyrodniczych uwarunkowań różnych form użytkowania przestrzeni pozwala na ocenę planu zagospodarowania przestrzennego gminy Pcim w jego części dotyczącej wsi Trzebuńka. Zakłada się w nim rozwój funkcji rolno-leśnej i turystyczno-wypoczynkowej. Właściwe jest przyjęte połączenie kilku możliwości gospodarowania środowiskiem. Rolnictwo ma najlepsze warunki w typach uroczysk spłaszczeń denudacyjnych w poziomie przydolinnych, spłaszczeń denudacyjnych niskich i stoków łagodnych 6-10°. W większości pozostałych typów uroczysk z powodu dużej dynamiki rzeźby optymalnym użytkowaniem jest las. Dla realizacji funkcji turystyczno-wypoczynkowej konieczne jest szybkie uporządkowanie gospodarki wodno-ściekowej. Szczegółowe decyzje lokalizacyjne zakładane w planie zagospodarowania wymagają korekty. Dotyczy to zakazu zabudowy w typach

uroczysk osuwisk i teras zalewowych Trzebunki. Obiekty uciążliwe dla środowiska, obszary chronione i atrakcyjne turystycznie powinny być wyznaczane w konsultacji ze specjalistami zajmującymi się komponentami środowiska i ekologią krajobrazu.

Planiści powinni w większym stopniu wykorzystywać kompleksowe opracowania przyrodnicze. Pozwoliłoby to już na wstępnym etapie gospodarowania wskazać potencjalne konflikty, sprecyzować wymogi realizacyjne dla inwestycji i optymalnie wykorzystać zasoby środowiska.

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