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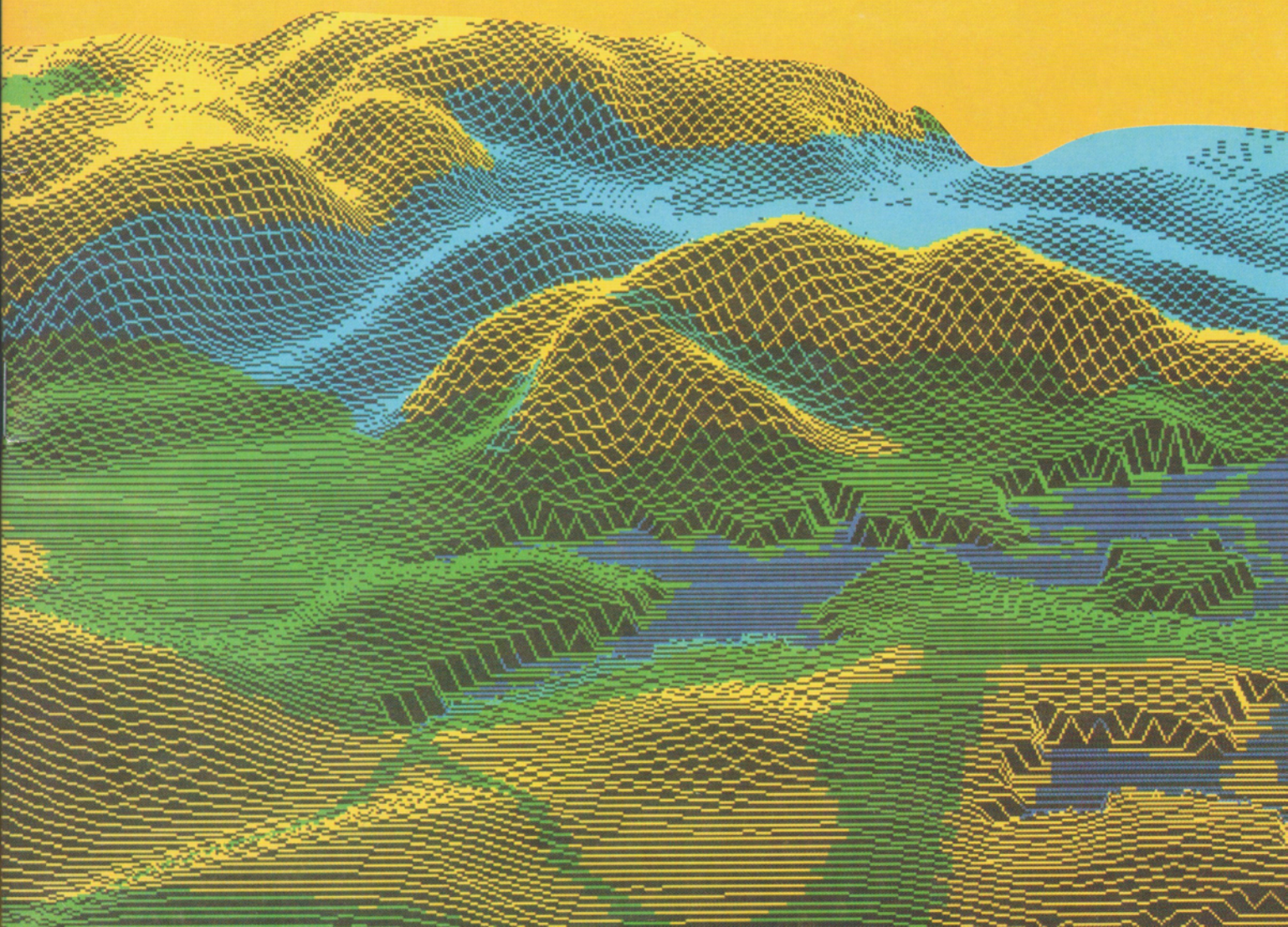

The nuclear power plant Dukovany - an anthropogenic element in the landscape a view from the East

The past and the present: cooling towers of the nuclear power plant at Dukovany and the chapel of the destroyed village of Lipňany

Illustrations to the paper of H. Horská et al.; photos: Mojmír HRÁDEK

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SLOPE FAILURES IN METAMORPHIC BASEMENT ROCKS OF THE DYJE RIVER VALLEY, PODYJÍ NATIONAL PARK, CZECH REPUBLIC

Jaromír DEMEK - Jiří KOPECKÝ Sn.

Abstract

The present paper deals with the results of geomorphological and speleological mapping of slope failures in the segment of deep meandering Dyje River valley downstream of the town of Vranov nad Dyjí. Detailed geomorphological mapping at a scale of 1:5 000 has enabled an interpretation of the mechanism involved in the development of slope instabilities.

Shrnutí

Poruchy svahů ve skalních horninách údolí řeky Dyje v Národním parku Podyjí, Česká republika.

Autoři se v článku zabývají výsledky geomorfologického a speleologického mapování poruch svahů v úseku hlubokého údolí řeky Dyje pod Vranovem nad Dyjí. Podrobné geomorfologické mapování v měřítku 1:5 000 umožnilo interpretaci mechanismů činných v poruchách svahů.

Key words: slope failure, rock slab buckling, toppling, rock fall, rock slide, pseudokarst cave, The Dyje River Valley, The Podyjí National Park.

1. Introduction

In 1995, the authors geomorphologically mapped the eastern half of the map sheet at a scale of 1:5 000 Vranov 2-4 and the western half of the sheet Vranov 3-4 for the Directorate of the Podyjí National Park. The National Park was established in 1991 and is located in the SE part of the Czech Republic on the border with Austria (in an area called the Bohemian-Moravian Highland). Its axis is formed by a deep valley of the Dyje River (known as the Thaya River in Austria) between the towns of Vranov nad Dyjí to the West and Znojmo to the East. A basic feature of the territory is a difference between the levelled surface of the Bohemian-Moravian Highland and the deep valley of the Dyje River. The river has eroded a deep incised meander valley in the resistant metamorphic rocks. Slope failures on the steep valley slopes were described by Roth (1863). The authors have conducted a detailed investigation into the slope failures in hard rocks on that section of the Dyje River valley to the SW of the town of Vranov nad Dyjí. Investigation difficulties were caused by densely forested steep slopes and a chaos of cliffs, tors, rock pillars and blocks.

2. Situation

The map shows a 6.65 km long section of the deep Dyje River valley beginning at Zadní Hamry (part of the town of Vranov nad Dyjí) and ending at the castellated rocks of the Schwalbenfelsen in Austria. Here the river flow elevation is approx. 300 to 290 m. In the mapped area, the Dyje River forms three deep incised valley meanders-upper, middle and lower. The incised valley meanders exhibit a pronounced asymmetry in the cross profile with the undercut valley slopes on the outside of meander curves and the slip off meander spurs on the inside.

The plan view of the Valley meanders is rectangular rather than being regularly arcuate, phenomenon Ivan - Kirchner (1996) attribute to high resistance of the basement rock.

The spur of the upper valley meander is called the „Rock Labyrinth". The spur runs in the WE direction and

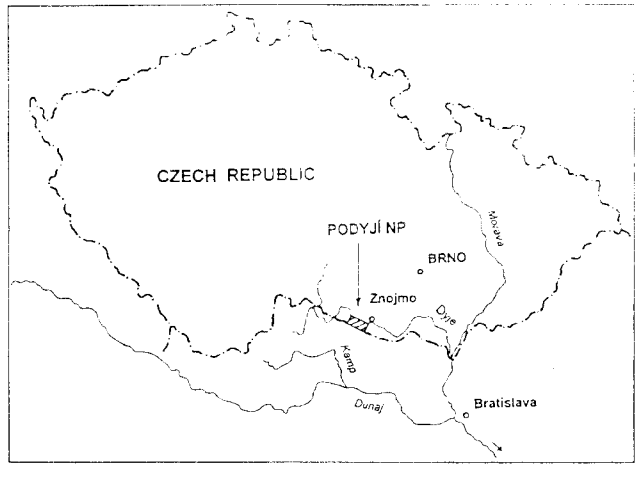

Fig. 1 Location of the Podyjí National Park

is about 250 m long. The spur elevation decreases from the levelled highland surface (the tract is called Braitava) towards the river. The „Rock Labyrinth" is composed of tors, rocky crests and blocks divided by dilatated fractures. On its sides, the spur is bordered by cliffs.

Špalek (1935a) described the meander core developed by the upper meander spur cutoff. The route around it (a meander scar) abandoned by the Dyje River has been recently filled with alluvial cones of the brook U zborceného mostku. On the undercut rocky left-side slope on the outside of the upper meander, cliffs developed of up to 30 m in height.

The spur of the middle valley meander was formed by the crest of Ledové sluje (Ice Caves). The spur has a ENE-WSW direction and is about 800 m long. The rocky section (crest) is about 550 m long. Its highest point occurs at about 130 m above the river bed. The undercut right-side valley slope on the outside of the middle meander exhibits an amphitheatric form. This steep slope is about 220 m high and in cross section is composed of two parts: upper and lower. The upper part (up to 130 m high) is formed by rows of cliffs, rock pillars, and short rocky crests divided by amphitheatric heads (niches) of dells and short slope valleys. The lower one, less inclined, is represented by talus slopes with angular blocks, block streams and block fields.

The spur of the lover valley meander is called Býčí hora (Bull Mount). The spur trend, from W to E, is about 750 m long. Its highest point is about 190 m above the river bed. The spur is basically rounded. On its surface the authors mapped cliffs, dilatated fractures and pseudokarst dolines. Opposite of the undercut on the leftside of the valley slope, below the Smuggler's Trail, it is steep and rocky. There are frequent cliffs exposing bedrock rocks and prominent castellated similarly rocks as in „U křemenné žíly" (At Quartz Vein Rock), „U jeskyně" (At Cave Rock) or „Zikova skála" (Zika Rock). This slope is 270 m high.

On the valley bottom, a narrow floodplain has developed in two levels.

The surroundings of the Dyje River deep valley have been levelled. To the West of the valley, in the forest tract of Braitava, there are parts of a planated surface of about 535 m in elevation („U letohrádku" - At A Country-Seat). The basement rocks are near the surface and form castellated rocks, tors and convex shaped monadnocks. The planated surface is undulated by dells and by right tributaries of the Dyje River on the upper reaches. Nearer the deep valley, the lower reaches of the right tributaries are more incised. Gullies have developed on some of the valley bottoms.

To the East of the Dyje River valley, the authors found the remnants of a planation surface in the tract called „U Vranovské brány" (At the Vranov Gate) at an elevation of 496 m and in the „Větrník" tract at an elevation of 510 m. At this place long dells and upper reaches of the left tributaries of the Dyje River were also found. In addition, these valleys are incised nearer the deep valley of the Dyje River.

3. Morphostructure

The mapped area is represented on a detailed geological map of the Podyjí National Park published in 1993 (Batík, 1993). As to it morphostructure the mapped area is situated in the southeastern part of the Bohemian Massif. The basement rock throughout the mapped Dyje River valley section is the Bíteš leucocratic orthogneiss of the Moravicum Unit (Batík, 1993). Two-mica gneiss, the predominant rock, has a well developed schistosity and typical augen structure. In the predominant rock abundant intercalations of biotitic amphibolite and intercalations of biotitic or two-mica paragneiss are formed. The basement rocks are folded, sheared and crushed to form defect zones of variable width. Dimensions of the folds range from a few cm up to 20-30 m.

Batík (1993) mapped a fault parallel to the axis of the middle valley meander spur at the Ice Caves. Interestingly, the schists become weaker and more ductile with the increasing mica content.

4. Morphochronology

Little data exist on the relief development of the Mesozoic Period. The Tertiary Period saw the culmina-

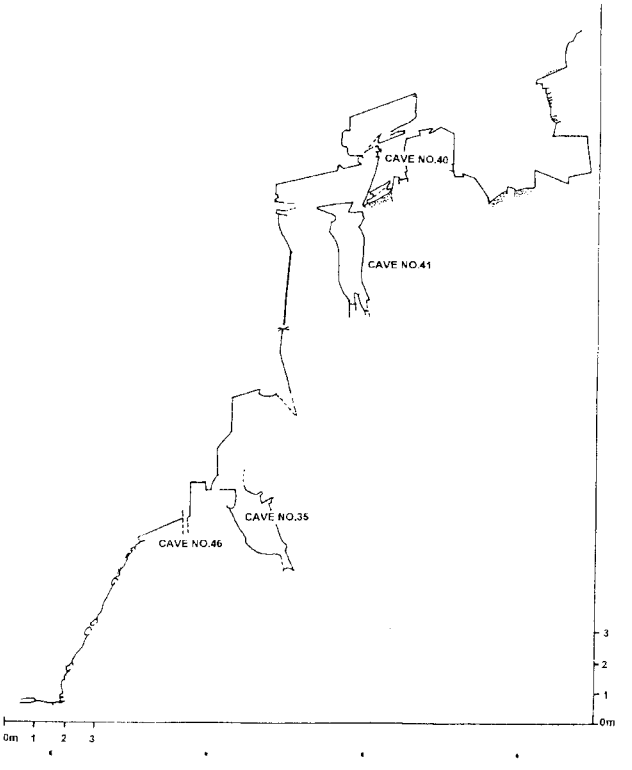

Fig. 2 Schematic cross section through the northern slope of the meander spur of the Ice Caves. Constructed by J. Kopecký Sn., 1996

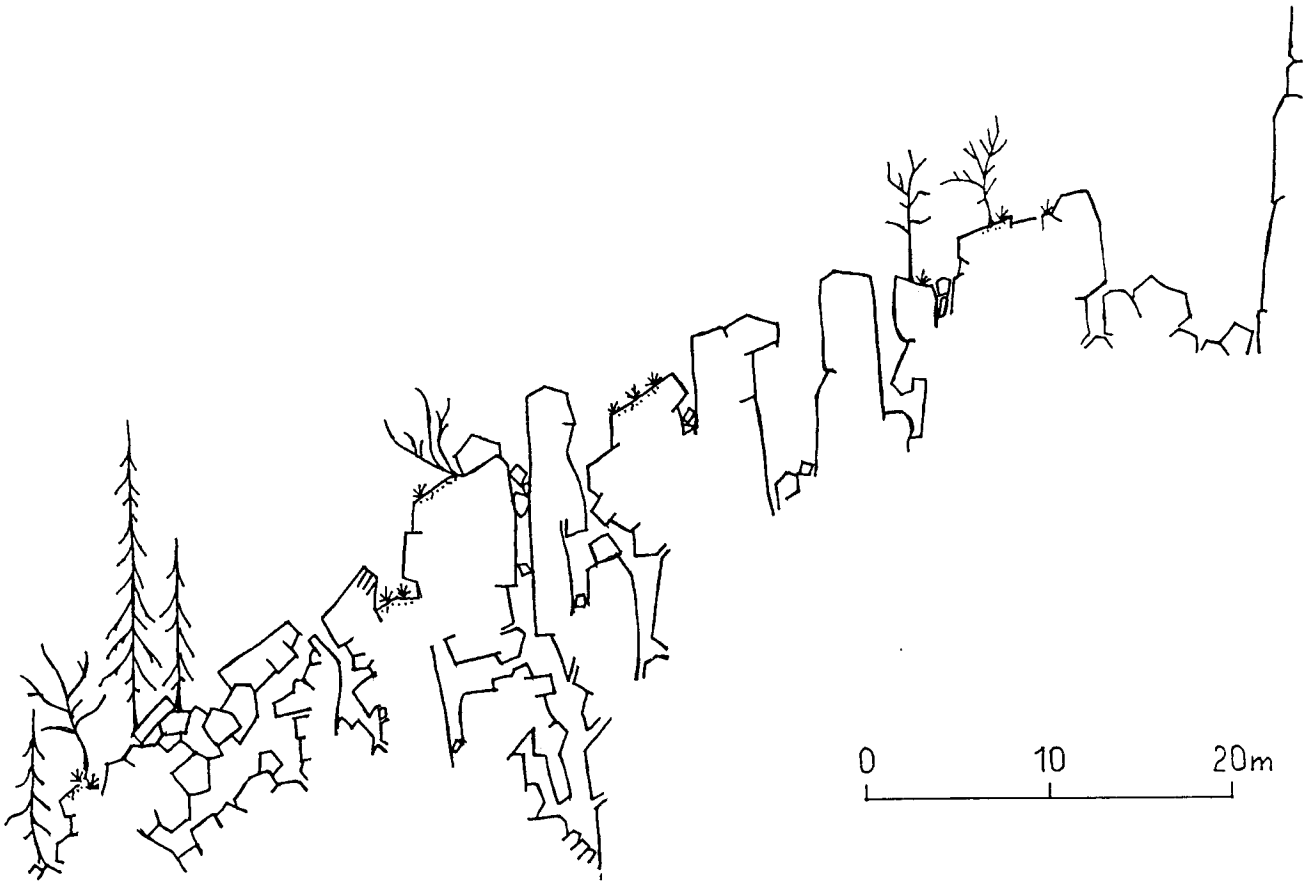

Fig. 3 Profile of the northern slope of the meander spur of the Ice Caves and pseudokarst caves in the „pillar No. 1 (northern)". Constructed by J. Wagner, 1994

tion of the development of a regional planation surface with thick kaolinitic weather mantle (a peneplain?). During the Lower Miocene, the studied territory was the part of a shallow sea. Predominantly clastic marine deposits sedimented onto the basement rocks. During the slow sea regression, the Dyje River valley formed the marine deposits in Miocene (Batík, 1993). Tectonic uplift at the southeastern part of the Bohemian Massif increased the gradient of the river and its power to erode. This process resulted in erosion of the deep meandering valley, in steepening of the valley slopes with subsequent stress relief, and slope instabilities. These instabilities range from rock slab buckling, toppling and minor rock falls up to large scale rock slides. During the cold phases of the Pleistocene, the area was in a periglacial zone with intensive cryogenic processes (Vítek, 1979), which supported slope instabilities caused both by unloading and spreading.

5. Slope failures

Slope instability developed on the northern slope of the middle meander spur. The spur is about 800 m long and runs in an ENE-WSW direction. Its elevation decreases from the highest point at the monument (430 m a. s. l., 130 m above the river) towards the WSW (down to 50 m above the river bed). The ENE section of the spur exhibits the form of a rounded ridge. From the monument to the WSW the spur forms a rock crest. The length of this section is about 550 m. The crest is limited by cliffs on both sides. The South-facing cliffs are more coherent and higher. The basement rocks are loosened along the fissures in the NW-SE, ENE-WSW and NEN-SWS directions. The dilatated fissures are partially filled with angular blocks, some of them forming wide gaps. On the spur, WSW of the monument, a rectangular net of dilatated fissures forms a stone pavement. The surface is divided into large blocks separated by wide gaps. Pseudokarst dolines developed at the beginning of the spur on fissure crossings. Several dolines are funnel shaped and round or oval in the plane view. The dolines range in size from a few meters up to 25 m in diameter.

The headwall of the rock slide is situated on the northern slope just below the monument (spot height 430 m). The terrain above the headwall is characterized by prominent weathered zones and gaps. The headwall has in the plan view an arcuate form and runs in the ENE-WSW direction. The wall is generally 25 m to 30 m high (Fig.2). Along the headwall, there are the subsided blocks of gneiss wich have, a valleyward moved at the same time. A major trough that originated through these movements is filled with angular blocks of large dimensions. In an ENE direction from the monument, the

depression is less prominent, but can easily be followed in the field. The trough is obviously identical with a fault shown on the above mentioned geological map by Batík (1993).

The rockslide complex consists of a number of secondary troughs of slide debris (Fig.2 and Fig. 3) separated by blocks of relatively intact bedrocks (locally called „pillars"). The surface of the rock block subsided along the headwall corresponds to the elevation of 410 m, that is about 20 m lower than the surface of the spur (spot height 430 m a. s. l.). The secondary troughs and dilatated fissures parallel to the headwall are separating other blocks on the northern slope. The blocks are steplike, arranged on the northern slope, some of them forming the antiscarps. The troughs separating the surface of the block are filled with angular rock fragments. Below the blocks, there are entrances into the pseudokarst caves.

The caves concentrate into 2 huge blocks of relatively intact rocks („pillars"). However, loosening of the bedrock in these 2 „pillars" reaches very deep since the caves currently mapped are situated at the depths of as much as 40 m below the terrain surface (Kopecký, 1996) that is up to a niveau of 340 m a. s. l. The dilatated fissures which are not accessible by speleologists reach even deeper.

The largest caves exhibit a width of up to 6 m. Polishes (slickensides) were found in the caves near the headwall fault.

The fissure caves prevail. Only the uppermost parts of large caves and the small caves themselves are of block cave type. Prevailing are also pseudokarst caves with multiple niveaus. In the depth of slope, the caves in one trough communicate (are connected) with the caves in another parallel trough. The largest cave system has a polygon of more than 500 m. This is also an evidence of the extensive and deep loosening of the bedrock.

The caves are famous for their content of underground ice. It is a unique phenomenon in the warm climate of South Moravia. The cave microclimate was investigated in the 19th century (Roth, 1863). In the spring of 1996, after several years with a small content of cave ice, thick ice filling in caves and in blockfields was observed.

In the lower third part of the northern slope, there are creeping or dormant blockfields (Fig. 4) composed of the thick landslide debris. In the creeping sections of the blockfields, blocks are moving. In the spring of 1996 a trail running through the blockfields was buried by the blocks.

Geomorphological mapping to define the rockslide limits and to locate surface evidence of failure planes formed the er investigation work on the slide. Mapping scale 1:5 000 depended on the topographic base and the amount of detail available. The caves were investigated and mapped at a scale of 1:5 000 (Kopecký, 1996). The rockslide had been targeted for monitoring since 1990 (Zvelebil et al., 1996).

Rock slide is a result of gravitational movements and spreading of the steep-sided valley slopes. Depths of a major trough are indicative of a deep-seated deformation. The initial development of slope instability would have been caused by the following predominant modes:

i) effects of slope deformations resulting from the linear erosion of a deep valley of the Dyje River and related stress relief in the bedrock,
ii) weak zones in the gneiss massif (e.g. the above mentioned fault of the Ice Caves Meander Spur), and
iii) lateral erosion of the Dyje River at the foot of the northern slope connected with a cutoff (Špalek, 1935a, 1935b).

6. Spreading of ridges and crests

The authors studied spreading of ridges and crests in the area of the „Rock Labyrinth" and the Bull Mt. A ground reconnaissance of densely forested ridges indicates that their top has undergone significant deformations. The ridges are broken up by troughs and partially-infilled with rock debris. There are fissures, up to several meters wide, running parallel to the axes of ridges and crests. Other dilatated transversal fissures run across the ridge. Troughs have sharp edges and appear to be relatively fresh. The fresh appearance of the majority of troughs is indicative of ongoing gravitational deformation.

Also, pseudokarst caves were found in these ridges. Both the Mahr Fissure Cave (14 m deep, 2.3 m width, 3.5 m high) and the European Elder Cave (5 m deep, 4 m high, 1.5 m width) are to be found in the southern cliff of the Bull Mount. Troughs were also found on flat surfaces.

7. Spreading on the right valley slope

On the right valley slope, downstream of Benátky (part of the town of Vranov nad Dyjí), there are frequent cliffs exposing the bedrock. The steplike arranged cliffs are separated by slope dells with amphitheatric head parts. Near the upper bridge, in the lower part of the right side valley slope, there are, several block streams formed by huge angular blocks. The huge blocks of gneiss reach the dimensions of 11x6x5 m. Heads of block streams are situated at the foot of high cliffs. They are an evidence of the repeated rock falls. Fresh blocks in the Dyje river bed are an evidence of the Holocene rock falls.

The authors investigated the retreat of valley slope sections by gravitational processes on the undercut rocky right-side slope on the outside of the middle meander. The amphitheatric slope is 220 m high.

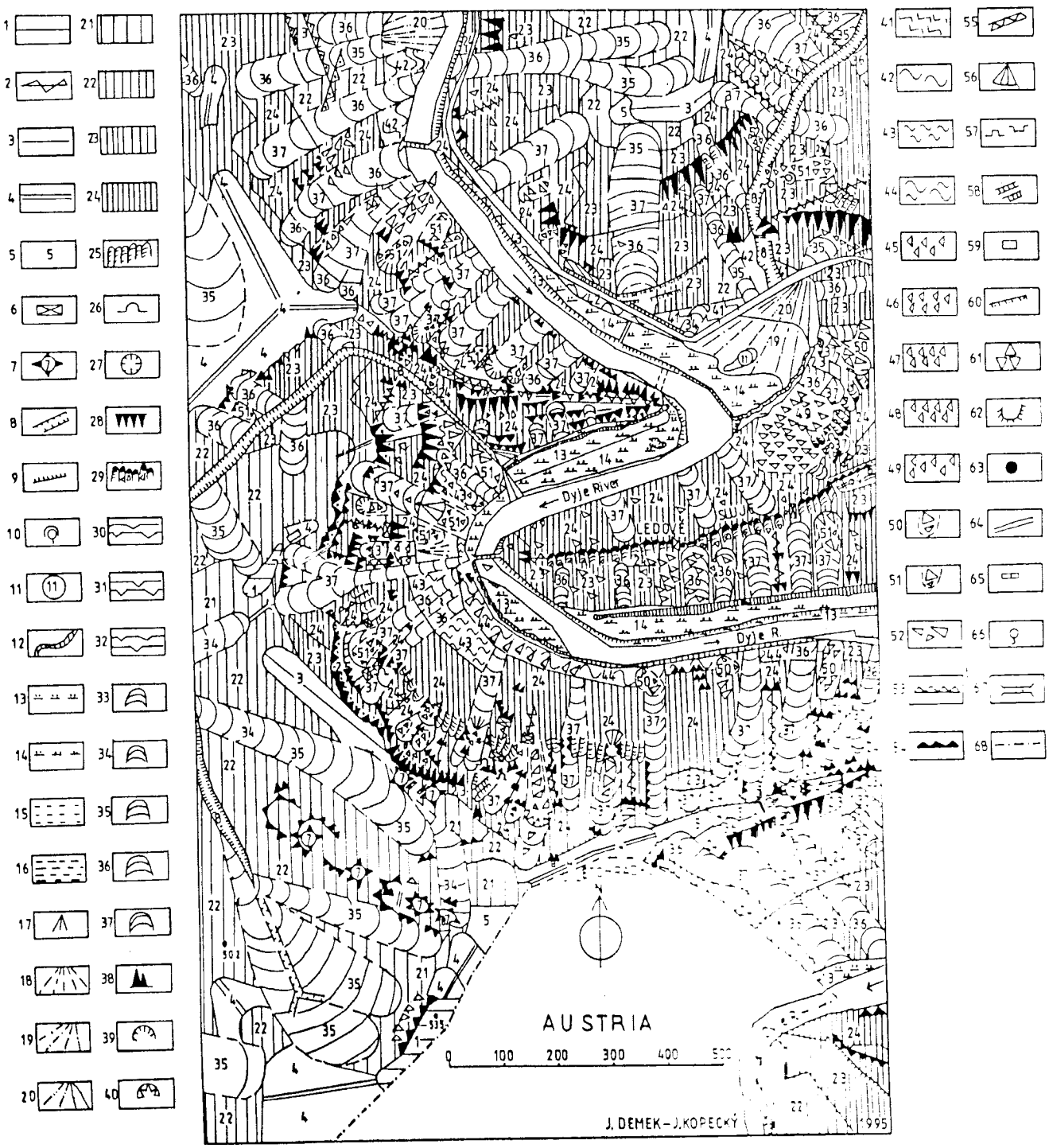

Fig.4 Detailed geomorphological map of the Dyje River Valley in the surroundings of Ice Caves

Legend to the detailed geomorphological map. Explanations:

1. Remnants of the polygenetic planation surface (etchplain), 2. narrow and rocky ridge, 3. narrow and rounded ridge developed by intersection of valley slopes, 4. broad and rounded ridge developed by the intersection of slopes, 5. spur, 6. rock pillar, 7. monadnock, 8. gully, 9. scarp developed due to lateral river erosion, 10. spring niche, 11. cutoff, 12. abandoned river bed, 13. low floodplain, 14. high floodplain, 15. accumulation bottom inclined to the axis of valley with inclination 0-2, 16. accumulation bottom inclined to the axis of valley with inclination 2-5, 17. accumulation bottom inclined to the axis of valley with inclination 5-15, 18. surface of alluvial cone with inclination 0-2, 19. surface of alluvial cone with inclination 2-5, 20. surface of alluvial cone with inclination 5-15, 21. valley slope inclined 2-5, 22. valley slope inclined 5-15, 23. valley slope inclined 15-25, 24. valley slope inclined 25-35, 25. valley slope inclined 35 and more, 26. pseudokarst cave, 27. pseudokarst doline, 28. frost-riven cliff, 29. rock wall modelled by cryogenic processes, 30. cryoplanation terrace inclined 0-2, 31. cryoplanation terrace inclined 2-5, 32. cryoplanation terrace inclined 5-15, 33. dell inclined 0-2, 34. dell inclined 2-5, 35. dell inclined 5-15, 36. dell inclined 15-25, 37. dell inclined 25-350, 38. tor, castle-koppie, 39. nivation hollow with smooth slopes covered by soil and scree, 40. nivation hollow with cliffs, 41. crest, 42. talus slope inclined 5-150, 43. talus slope inclined 15-25, 44. talus slope inclined 25-35°, 45. block field inclined 0-2°, 46. block field inclined 2-5°, 47. block field inclined 5-15°, 48. block field inclined 15 -25°, 49. block field inclined 25-35°, 50. block stream composed of angular block inclined 5-15°, 51. block field composed of angular blocks inclined 15-25°, 52. angular block, 53. root area of rock slide, 54. headwall of rockslide, 55. trough, dilatated fissure, 56. dejection cone, 57. quarry, active, abandoned, 58. sunken road, 59. pit, 60. agricultural balk, 61. agricultural damp, 62. mine dump, 63. bunker, 64. road, 65. country seat, 66. spring, 67. bridge, 68. state boundary.

Legenda k podrobné geomorfologické mapě. Vysvětlivky:

1. Zbytek (plošina) polygenetického vrcholového zarovnaného povrchu, 2. úzký a skalnatý hřbet, 3. úzký a zaoblený hřbet vzniklý protnutím svahů, 4. široký a zaoblený hřbet vzniklý protnutím svahů, 5. spočinek na svahu, 6. skalní věž, skalní pilíř, 7. suk, 8. strž, 9. stupeň vzniklý boční erozí vodního toku, 10. pramenný výklenek, 11. okrouhlík, 12. opuštěné koryto vodního toku, 13. nízká niva, 14. vysoká niva, 15. akumulační dno ukloněné ke středu údolí (údolnici) se sklonem 0-2°, 16. akumulační dno ukloněné ke středu údolí (údolnici) se sklonem 2-5°, 17. akumulační dno ukloněné ke středu údolí (údolnici) se sklonem 5-15°, 18. povrch náplavového kužele o sklonu 0-2°, 19. povrch náplavového kužele o sklonu 2-5°, 20. povrch náplavového kužele o sklonu 5-15°, 21. údolní svah o sklonu 2-5°, 22. údolní svah o sklonu 5-15°, 23. údolní svah o sklonu 15-25°, 24. údolní svah o sklonu 25-35°, 25. údolní svah o sklonu 35° a více, 26. pseudokrasové jeskyně, 27. pseudokrasový závrt, 28. mrazový srub, 29. skalní stěna modelovaná kryogenními geomorfologickými pochody, 30. kryoplanační terasa se sklonem 0-2, 31. kryoplanační terasa se sklonem 2-5°, 32. kryoplanační terasa se sklonem 5-15°, 33. úpad o sklonu 0-2°, 34. úpad o sklonu 2-5°, 35. úpad o sklonu 5-15°, 36. úpad o sklonu 15-25°, 37. úpad o sklonu 25-35°, 38. izolovaná skála, skalní hradba, 39. nivační sníženina s hladkými svahy pokrytými hlínou a balvany, 40. nivační sníženina se stupňovitými skalními svahy, 41. hřeben, 42. úpatní halda o sklonu 5-15°, 43. úpatní halda o sklonu 15-25°, 44. úpatní halda o sklonu 25-35°, 45. balvanové moře o sklonu 0-2°, 46. balvanové moře o sklonu 2-5°, 47. balvanové moře o sklonu 5-15°, 48. balvanové moře o sklonu 15-25°, 49. balvanové moře o sklonu 25-35°, 50. balvanový proud složený z hranáčů o sklonu 5-15°, 51. balvanový proud složený z hranáčů o sklonu 15-25°, 52. hranáč, 53. odlučná oblast skalního sesuvu, 54. skalní stěna odlučné oblasti skalního sesuvu, 55. hranáčová závrtová strouha, 56. dejekční kužel, 57. lom, opuštěný, činný, 58. úvoz, 59. jáma, 60. agrární mez, 61. agrární halda, 62. těžební halda, 63. řopík, 64. silnice, 65. letohrádek, 66. pramen, 67. můstek, 68. státní hranice.

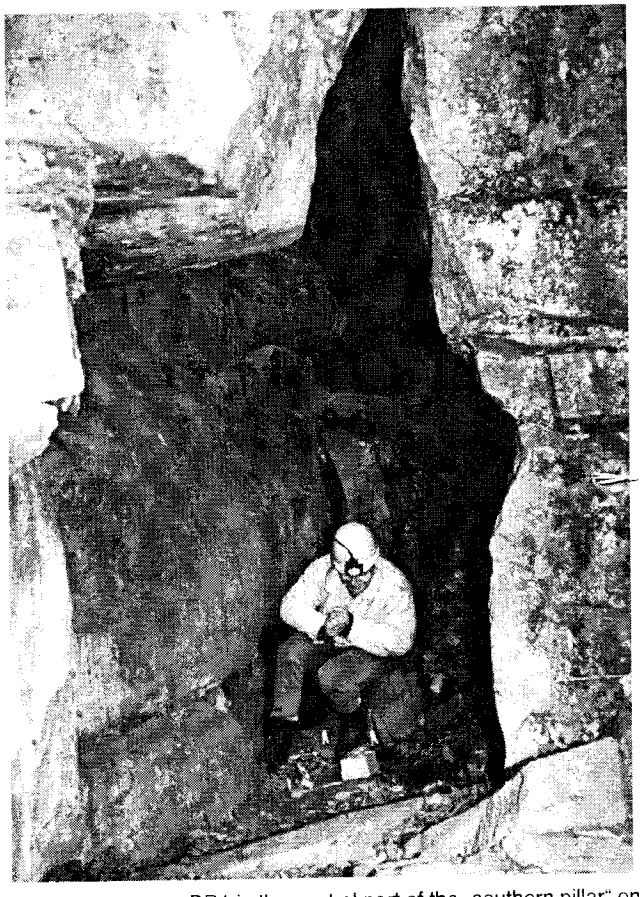

Fig. 5 Fissure cave BR1 in the central part of the „southern pillar" on the northen slope of the middle meander spur. The broda and deep trough has a prolongation as a cave system.

Gneiss on the slope exhibits both the sheet jointing in some parts and the strong folding in others (e.g. near the Country-Seat in the Braitava forest tract).

The valley slope is composed of an upper and a lower part. The upper steep part is about 130 m high. The general slope inclination is over 35. It is well known that high stress (rock pressure) will occur in valley slopes if the overall inclination of valley slopes exceeds 25 (Beetham et al.,1991). There are frequent cliffs exposing the bedrock rocks (mostly gneiss) and the prominent rock pillars like the Eagle Nest Rock, the Upper View Rock (464 m a. s. l.), etc. A lower, less inclined part of the slope represents the talus slope with angular blocks, block streams and block fields.

Slope instabilities on this slope range from rock slab buckling on cliffs, toppling and rock falls to large failures.

The first type is the rock slab buckling on cliffs, induced by very severe horizontal stress. Near to the surface, the high horizontal stress exceeds the vertical stress by order(s) of magnitude. Rock slabs slides accumulate at the foot of the cliffs.

The second type of instability is the toppling of rock pillars. The toppling dilatates the fissures and causes the development of pseudokarst fissure caves.

The third type is the rock fall from the cliffs. This process was most active during the transition phases between the cold and warm periods of the Pleistocene. However, the fresh blocks in the river bed are an evidence of the Holocene rock falls. The blocks fallen from the cliffs form the block streams, block fields and scree slopes at their feet .The largest block stream at a cliff foot is about 100 m long and 60 m wide. The block stream consists of angular blocks with dimensions of about 4x2x1.5 m in size.

The fourth type consists of large failures. The upper edge of the slope is rimmed by rows of headwalls. The headwalls are arcuated in the plan view. Dilatated fissures can be followed backwards from the headwalls into the flat terrain behind the cliffs. Individual headwalls are divided by nivation niches at the heads of the slope dells. Some of the niches exhibit smooth sides covered by soil. Other take the form of small cirques with cliffs. Rock sliding was caused by undercutting the slope by the nivation processes combined with stress release. There are blocks and block streams at the bottom of the dells (Fig. 4). Blocks which have slid along the slip surfaces marked by headwall forms antiscarps in some places.

The slope dells are divided by narrow rocky crests with rock pillars. Dilatated transversal fissures divide the

Fig. 6 Fissure cave BR4 in the „Southern pillar" of the northern slope of the middle meander spur. The cave is covered with Carge slat-like bloks of gneiss.

crests into relatively intact blocks and rock pillars. Toppling of pillars is the reason for a common presence of the fissure caves. Most of the crests end at up to 40 m high cliffs which are situated approx. 90 m above the Dyje river bed (Fig. 4). Dells crossing this level of the end cliffs are narrowed, sometimes exhibiting a form of gorges. Features of unloading were observed on the cliffs. Unloading slabs divided from the cliffs have slid to their feet.

The talus slope at the foot of the slope is a complex structure consisting of the slope deposits of various kinds. Most prevalent are colluvial deposits composed of loam with angular blocks. At some places (Fig. 4), block streams and block fields consisting of scree have developed. There are also deposits of both alluvial and debris cones.

8. Spreading of the left valley slope around the Smuggler's trail

The undercut left-side valley slope around the Smuggler's Trail is steep and rocky. There are frequent cliffs exposing the bedrock rocks and prominent castellated rocks as in „U křemenné žíly" (the Quartz Vein Rock), „U jeskyně" (the Cave Rock) or „Zikova skála" (the Zika Rock). The described slope is 270 m high.

The prominent rock group called Cave Rock is mostly situated above the Smuggler's Trail. It is a rocky ridge running along the slope in the E-W direction. On the southern side, there is a rock group bordered limited by cliffs. There are also transversal dilatated fissures forming troughs which are partly filled with angular rock fragments.

The Smuggler's Trail crosses this rock group below high cliffs which are 83 m long and 30 m high. The cliffs are parallel to the Dyje river bed. The bedrock (gneiss) is shattered. The fissures are dilatated. Near the Trail, a combined pseudokarst cave developed. The cave is 6 m deep, 1.5 m wide and 3.5 m high. Below the trail, there are short rock crests ending in cliffs (about 13 m high). At the foot of cliffs rock streams reaching up to the Dyje river bed have developed.

The prominent rock group Zika Rock is situated below the Smuggler's Trail. The rock group consists of 4 parallel ridges separated by gorges. The ridges are bordered by high cliffs. The cliffs parallel to the Dyje River bed are about 22 m high. At the foot of the cliffs, block streams consisting of huge blocks (up to 4 m in diameter) developed. The block streams reach the Dyje river bed.

9. Conclusions

Results of the geomorphological mapping facilitate interpretation of the mechanism involved in the development of slope failures in the deep meandering valley of the Dyje River. Detailed investigations in the Dyje River valley have revealed that the development of slope failures is controlled by rock mass properties and by steep valley topography.

Acknowledgments

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ANTHROPOGENIC TRANSFORMATION OF RELIEF IN THE GABČÍKOVO WATERWORK AREA (SW SLOVAKIA)

Ján LACIKA

Abstract

This contribution deals with the problems of dynamics of the anthropogenic relief transformation in the Gabčíkovo Waterwork area. The Gabčíkovo Waterwork was built in the period from 1971 to 1992 on the Danube River by former Czechoslovakia and Hungary (Vidra ed., 1990). Three stages of the anthropogenic relief in the research area were analysed; prior the construction works (1970), during building of the waterwork (1991) and after the construction (1995).

Landforms were subject to the following monitoring: functional classification, analysis of the area distribution (mapping), evaluation of the intensity of the anthropogenic relief transformation, correlation of maps mapped in various periods.

Shrnutí

Antropogenní transformace reliéfu v oblasti vodního díla Gabčíkovo na jihovýchodním Slovensku.

Článek se zabývá problémy dynamiky antropogenních transformací reliéfu v oblasti vodního díla Gabčíkovo vybudovaného v letech 1971-1992 na Dunaji bývalým Československem a Maďarskem. Jsou analyzovány tři etapy výzkumu antropogenních transformací reliéfu: 1. před začátkem stavby (1971), 2. během stavby (do r. 1991), 3. po uvedení do provozu (1995). Tvary byly analyzovány z hlediska funkční klasifikace, plošného rozmístění, intenzity antropogenní transformace a srovnání map z jednotlivých období.

Key words: anthropogenic geomorphology, transformation of landforms, the Gabčíkovo Waterwork

1. Introduction

The contribution presents the problems of dynamics of the anthropogenic relief transformation as a partial indicator of the anthropogenic landscape transformation. This process is demonstrated in the Gabčíkovo Waterwork area.

2. Method

The process of evaluation of the dynamics of the anthropogenic relief transformation has its functional and chronological aspects. Both were used in the following four steps.

a) functional classification,

b) mapping of the area distribution,

c) evaluation of the intensity of the anthropogenic relief transformation,

d) correlation of the maps set-up in different periods of time.

The first step of this methodology is directed to the elaboration of functional classification of the occuring anthropogenic landforms (communal, urban, agricultural, etc.).

Detailed geomorphological mapping takes through the second step. The map legend is generated according to the previous landform classification. There are two ways of the mapping mentioned in this contribution. Mapping of the last stage of anthropogenic landforms is

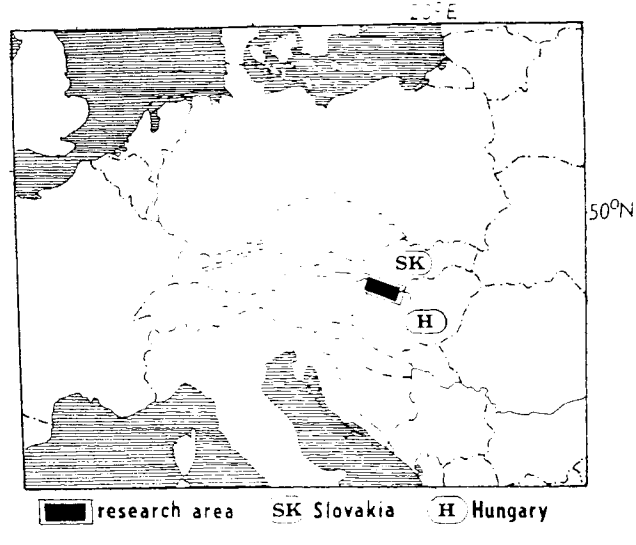

Fig. 1 Location of the Gabčíkovo Waterwork

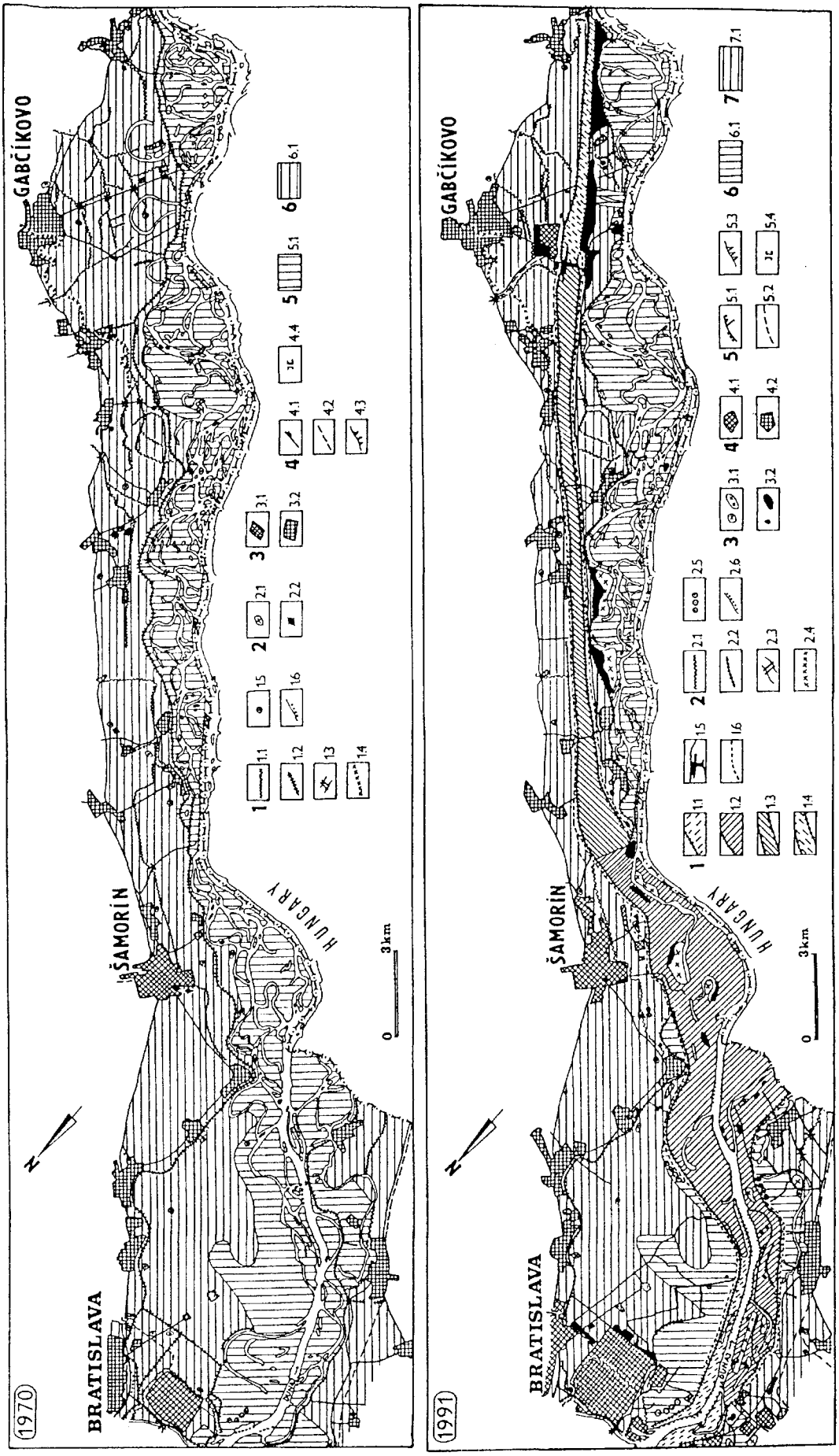

Fig. 2 Antrophogenic forms in the area Gabčíkovo

made from the topographical maps (taking into consideration the quality and scale of older maps). Mapping of the present anthropogenic landforms is made in the field with a sketching of the results into the topographical map 1:10 000.

The third step evaluates the classified and mapped landforms according to the intensity of anthropogenic relief transformation. The evaluation uses quantitative (volume, height, length, etc) and qualitative (used material, hardness, building costs, etc.) characteristics of the evaluated landforms. The landforms are given into 4-6 levels of the intensity of anthropogenic relief transformation and shown in the maps.

The final fourth step correlates the final maps showing the mapped information in different periods. It must accept a variability of the correlated maps according to their completeness and scale. The result of these correlations shows time and spatial dynamics of anthropogenic relief transformation.

3. Brief geomorphological characteristics

3.1 Morphometry

The research area is included into the Podunajská Rovina Plain (partial unit of the Podunajská Nížina Lowland). Its name shows the morphometrical properties of this area. The whole area is flat with relief dissection less than 5 m/km^2. The highest denivelation has been made by human activities only. The slope inclination is less than 1°. The Danube riverbed declines very gently from 0,16 to 0,57° (Tab. 1). There is a gentle convexivity in the transversal profile. The Danube riverbed is situated on the top of the flat convex curve. Top of this curve near Bodíky village is 5 meter high.

3.2 Morphogenesis

Three basic groups of processes have taken part in the creation of the research area morphogenesis: different tectonical subsidence, aggradation of fluvial deposits and human activity (Lacika - Stankoviansky, 1991).

In terms of its morphostructure, the research area can be characterized as a large tectonical depression - Žitný Ostrov graben, subsided along the complicated system of active faults. It is a typical graben filled by with Pliocene and Quaternary fluvial deposits (Halouzka, 1977 and 1993). Thickness of these deposits increases from the periphery towards the centre of the Žitný Ostrov graben. There are 15 m of deposits in Bratislava (Vaškovský, 1986) and 300 m close to Dunajská Streda (Buday, 1967). Step-like subsidence towards the transversal dirrection is not so good investigated. A very significant seismic fault has bordered the Žitný Ostrov graben from NE.

Morphosculpture of the research area has been created by Danube river fluvial activity (Halouzka, 1994). It was influenced by spatially changed morphostructural properties and timely changed morphoclimatic properties. The Danube river was forced to aggraded by changed morphotectonics between the uplifted Malé Karpaty horst and the subsided Žitný Ostrov graben. Out of the horst, the Danube river created a large alluvial fan (inland delta), built by a thick complex of sands, gravels filled with underground water. There is a very close hydraulic connection between the river and the underground water (Lehotský - Otaheľ - Grešková, 1990). The inundation belt along the Danube river was very wide before the human impact in this natural landscape. Old maps show it very good. The original fluvial process unlimited by men created a dense network of riverbeds and river arms. It was unequable. Some areas were filled slowlier and formed shallow wet depressions with marshes (Lukniš - Mazúr, 1959). Later, inundation dams reduced the areas of active fluvial processes into narrow belts along the Danube and the Malý Dunaj riverbeds.

4. Anthropogenic relief

4.1 Anthropogenic relief transformation until 1970

People have already changed landscape since the Neolithic Period. However, the essential landscape transformation occured only during the 19th century. There are natural stages of the research area in the old maps from the 18th century, which express a naturally branched Danube river without being influenced by human activities.

The great relief and lanscape transformations begun in the end of the 19th century. The people living close to the Danube river started to build the first levees, irrigation canals and regulate the natural river banks. The natural landscape was pressed into the inundation levees. The originally natural landscape outside this inundation belt was changed into agricultural and urban landscapes.

4.2 Anthropogenic relief - the situation in 1970

The stage of anthropogenic relief of the research area in 1970 was identified by topographical maps 1:10 000. Results of this mapping are shown in Fig. 2 (above) with the following legend:

1. Water management landforms

1.1 irrigation canals
1.2 levees
1.3 dams
1.4 regulated riverbeds and river arms
1.5 wells
1.6 regulated (reinforced) river banks

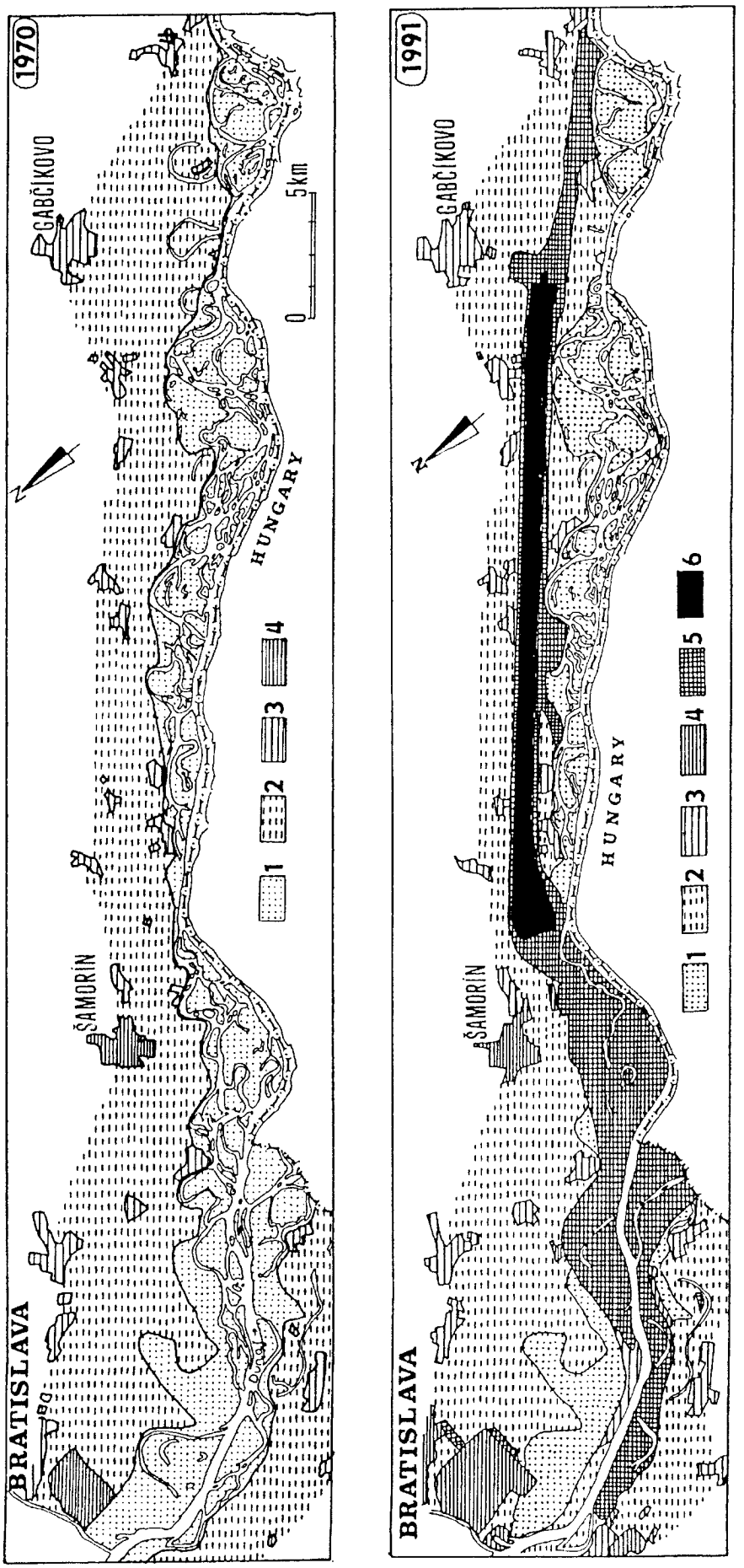

Fig. 3 Intensity of antrophogenic relief transformations

2. Outputting and communal landforms
2.1 gravel pits, sand pits and loam pits
2.2 taluses and dumps
3. Urban landforms
3.1 relief transformed by building activity of urban type
3.2 relief transformed by building activity of rural type
4. Communication landforms
4.1 reintorced roads
4.2 railways
4.3 directing dams into riverbed
4.4 bridges
5. Forest landforms
5.1 relief partly transformed by forest management
6. Agricultural landforms
6.1 relief partly transformed by agricultural activity

There was mainly a system of levees and irrigation canals in the research area in 1970. The system of levees had two different parts. The upper part levees was situated far from themain Danube riverbed (more than 5 km). A much complicated levee network was built round the big petrochemical factory - Slovnaft. The levees in the lower part narrowed to the riverbed and the inundation belt was very narrow (less than 2 km). Small dams were built inside of the inundation belt in 1970. Regulations of the river banks were rare.

Mapping of the distribution of surface mining and communal landforms in 1970 depended on the quality of information in the topographical maps. Several gravel pits, sand pits, loam pits, taluses and dumps were identified, particularly those located close to settlements. There were mostly rural type of settlements with less anthropogenic relief transformation. Šamorín and specific industrial Slovnaft area were identified as urban types of the settlement with more anthropogenic relief transformation in 1970. The communication landforms (the situation in 1970) included the reinforced roads, railways, bridges and special dams to improve the river transport condition inside of the Danube riverbed.

There are four intensity levels of the anthropogenic relief transformation in the map (Fig. 3 - above) shown in the situation in 1970. The lowest intensity was identified in the alluvial forest inside of the inundation belt. The highest intensity can be found in the areas of urban type settlements.

4.3 Anthropogenic relief - the situation in 1991

Construction of the Gabčíkovo waterwork changed the landscape under study very much. The stage of the anthropogenic relief transformation is shown in Fig. 2 (bellow) with the following legend:

1. Multifunctional landforms (waterwork)
1.1 less anthropogenically transformed relief of the future basin
1.2 more anthropogenically transformed relief of the future basin
1.3 inlet canal
1.4 outlet canal
1.5 power plant and lock chambers
1.6 soak canals
2. Water management landforms
2.1 irrigation canals
2.2 levees
2.3 dams
2.4 regulated riverbeds and river arms
2.5 wells
2.6 regulated (reinforced) river banks
3. Surface mining landforms and communal landforms
3.1 gravel pits, sand pits and loam pits (dry and wet)
3.2 taluses, dumps and filled depressions
4. Urban landforms
4.1 relief transformed by construction of urban type
4.2 relief transformed by construction of rural type
5. Communication landforms
5.1 reintorced roads
5.2 railways

Tab. 1: Longitudinal profile of the Slovak Danube riverbed (k. ú. = cadastral district)

POINT of PROFILE	km from MOUTH	ALTITUDE m	GRADIENT m/km
Morava mouth	1880	139.6	-
Devín (quarry)	1878	139.2	0.20
Wolfsthal	1875	138.6	0.20
Karlova Ves	1872	134.1	1.50
Most SNP Bridge	1869	132.3	0.60
Rusovce	1856	129.5	0.22
Čuňovo	1851	128.2	0.33
border SK/H	1850	126.5	0.43
k.ú. Vojka	1836	121.1	0.38
k.ú. Vojka	1833	120.6	0.16
k.ú. Horný Bar	1825	118.0	0.33
k.ú. Baka	1821	116.3	0.43
k.ú. Sap	1811	114.9	0.14
k.ú. Medveďov	1803	113.2	0.57
Rába mouth	1796	110.3	0.34
k.ú. Zlatná n. O.	1781	108.1	0.14
Pavel	1775	107.2	0.18
k.ú. Nová Stráž	1772	106.9	0.10
Váh mouth	1766	106.6	0.05
k.ú. Patince	1755	106.2	0.04
k.ú. Moča	1746	105.9	0.03
k.ú. Mužla	1730	105.8	0.01
k.ú. Štúrovo	1723	104.4	0.20
k.ú. Štúrovo	1718	103.6	0.16
Hron mouth	1716	103.2	0.20
k.ú. Kamenica n.H	1712	102.7	0.13
Ipeľ mouth	1708	101.6	0.28

5.3 directing dams into riverbed

5.4 bridges

6. Forest landforms

6.1 relief partly transformed by forest management

7. Agricultural landforms

7.1 relief partly transformed by agricultural activity

The Gabčíkovo Waterwork had several different parts in 1991. Most of them had not beenfinished during the mapping period. There was a future dam bordered by stone and concrete wall in the upper part of waterwork. The bottom of the future basin was dry during the mapping period. There were many of gravel pits identified on the bottom of the future basin. The central part of the waterwork was formed by an inlet canal up the power plant and lock chambers. An outlet (hollowed) canal was built downstream of them, returning the Danube water into the old riverbed. It was filled with underground water. The whole waterwork was bordered by a long system of soak canals.

The landscape changes were identified not only inside of the building-plot area bull less. New connections between the irrigation canals and soak canal had to made. The urban, surface mining and communal landforms grew larger.

The intensity of anthropogenic relief transformation is shown in Fig. 3 (bellow). The number of levels was increased from 4 to 6. The highest intensity was identidied in the area of the waterwark built of stone and concrete (inlet canal, power plant, lock chambers). The second highest intensity had most of the future basin, soak canals, outlet canal, the biggest pits and taluses in the research area. In 1991, the remaining area had a similar level of intensity of the anthropogenic relief transformation as in 1970 (besides the new districts on the margin of Bratislava and the extended Slovnaft area).

4.4 Anthropogenic relief transformation during the 1970-1991 period

There were pronounced changes of anthropogenic relief in the research area during the 1970-1991 period, connecting with building of the Gabčíkovo Waterwork. This is documented by the comparison of maps in Fig. 3. The area of the lowest intensity of anthropogenic relief transformation was very much reduced. In contrast, the areas with two highest intensities of the anthropogenic relief transformation were a new. Other differences are shown in Fig. 3.

4.5 Anthropogenic relief - the situation in 1995

The detailed mapping was not made after 1991. The maps were up-dated betwen the planned building of the waterwork and after filling the basin and canals. The Gabčíkovo Waterwork was put into operation in 1992. To Hungarian comments the project of the waterwork was changed. The dam holding the basin was moved. This was the cause to the reduction of the basin area and a lengthening of the inlet canal.

5. Conclusion

The Gabčíkovo Waterwork area gives a good example of an extraordinary anthropogenic relief transformation. It will be necessary to authorize the methodology of this contribution in different types of landscape and use it later as a very sensitive indicator of anthropogenic landscape transformation.

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PERCEPTION OF THE DUKOVANY NUCLEAR POWER PLANT (CZECH REPUBLIC) BY LOCAL POPULATION

Hana HORSKÁ - Oldřich MIKULÍK - Antonín VAISHAR - Jana ZAPLETALOVÁ

Abstract

The paper deals with some social consequences and regional impact of the nuclear power plant at Dukovany, south Moravia. It presents summaries and evaluation of results from several public inquiries made in the surroundings of the power generation system Dukovany-Dalešice in 1994 and 1995. The public inquiries were focused on problems of social environment in the region, perception of the nuclear power plant operating in the region by the local population, and also on recreation in the background of the nuclear power plant. Inquiries were addressed to local authorities, local inhabitants, owners of individual recreational facilities, and visitors of the camp at Hartvíkovice. Results bring an evidence of both positive and negative influences of the power generation system on social environment and its perception. The majority of population and holiday-makers feel endangered by the nuclear power plant. Nevertheless, the danger is often perceived less intensively than other kinds of risks. In any case, the future of the region as well as its future possible social revitalization are connected with the nuclear power plant and the associated waterworks at Dalešice.

Shrnutí

Percepce jaderné elektrárny Dukovany místním obyvatelstvem.

Článek se zabývá některými sociálními důsledky provozu jaderné elektrárny v regionu Dukovan na jižní Moravě. Shrnuje a hodnotí výsledky několika anketárních šetření, která proběhla v letech 1994 a 1995 v okolí energetické soustavy Dukovany-Dalešice. Tato anketární šetření byla zaměřena na problematiku sociálního prostředí v oblasti, na percepci jaderné elektrárny místním obyvatelstvem a rovněž na rekreaci v zázemí jaderné elektrárny. Dotazovány byly obecní úřady, místní obyvatelé, majitelé individuálních rekreačních objektů a návštěvníci kempu Hartvíkovice. Výsledky svědčí o pozitivních i negativních vlivech energetické soustavy na sociální prostředí a jeho percepci. Obyvatelé a rekreanti se většinou cítí jadernou elektrárnou ohroženi, ale toto ohrožení je vnímáno často méně intenzivně něž jiná ohrožení. V každém případě je budoucnost regionu a možnost jeho sociální revitalizace spojena s jadernou elektrárnou a navazujícím dalešickým vodním dílem.

Key words: nuclear power plant, social environment, perception, Dukovany-Dalešice

1. Introduction

The paper is the result of a partial research of social environment in the vicinity of Nuclear Power Plant (NPP) Dukovany. The work is an integral part of an extensive project whose objective was to assess in detail all environment components in the surroundings of the Nuclear Power Plant Dukovany taking into regard operation of the near military airport at Náměšť nad Oslavou. The project was funded by the foundation Ecology and Power Engineering, and it was worked out and coordinated by the West Moravian Museum in Třebíč. The study was aimed at a comparison of environmental changes in the close vicinity of the nuclear power plant, which occurred in the time period before the construction and after the works were put into operation.

Evaluation of impacts of large technical works on landscape and environment belongs to priority activities of the Brno Subsidiary of Institute of Geonics, Czech Academy of Sciences. The probably largest structures of this type have recently been nuclear power plants at Dukovany and Temelín. The great technical works such

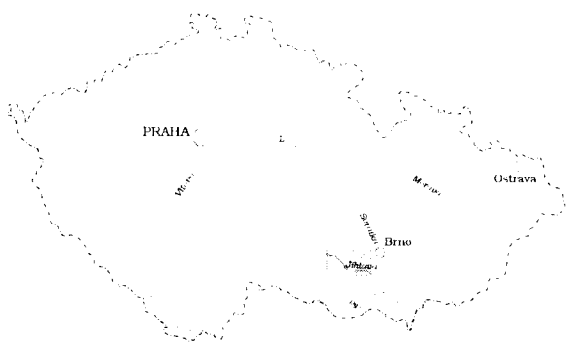

Fig. 1 Location of the area under study

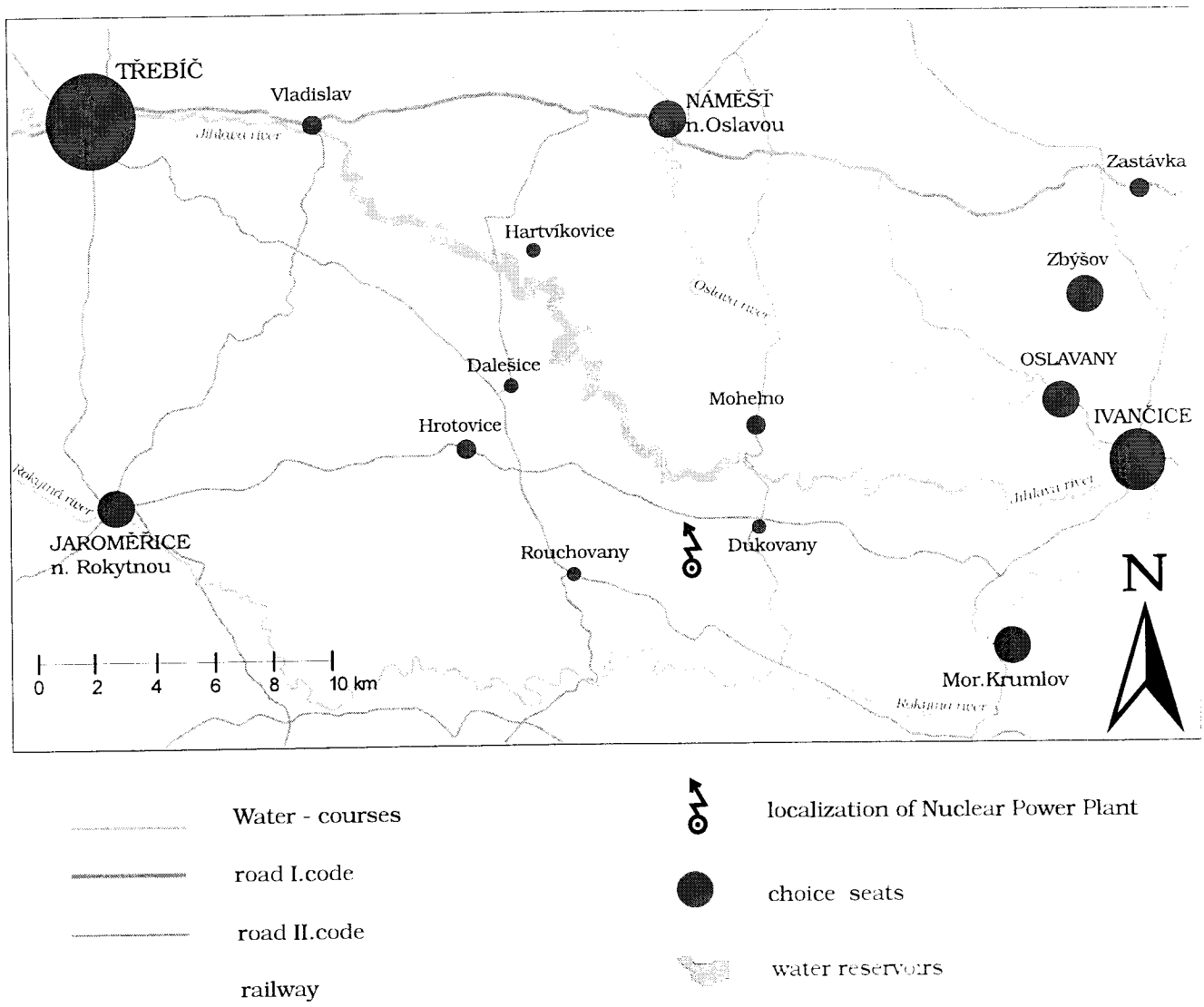

Fig. 2 The area under study

as nuclear power plants cause fundamental changes not only to the natural landscape system but also - and most probably even to larger extent - to the social system. In connection with the construction of power plant and later on with its operation there is a huge mechanical migration of population whose structure exhibits changes of nearly all aspects. The nuclear power plant itself needs further activities such as a water reservoir Dalešice for cooling, extensive dwelling facilities and infrastructure. The power plant affects the local population that has to get used to life with a certain permanent risk. On the other hand, the power plant may also mean an important stimulation of further development.

Operation of the Dukovany NPP has given rise to many disputes that even ended in problems of political character including international issues. These problems have become deeper after transformation of economic and social mechanisms in the Czech Republic. In addition to arguments that honestly aim at environmental impacts caused by operation of the nuclear power plant, there are also political and narrowly economic interests concerning reputation of various politicians and experts. The problems penetrate into awareness of local population and induce an atmosphere which is hardly opened to rational argumentation. Even this is one of social impacts of operating the nuclear power plants.

There were relatively a very few studies concerning the social consequences made prior to the construction with the exception of a general work by Buček - Lacina (1981) intended for internal use at the Dukovany NPP. The work includes a chapter on population, housing and recreation in the area of construction and operation of the nuclear power plant. Of these issues, only that of recreation was studied in depth. Synthesis of the entire problem in the study mentioned does not at all mention social phenomena. It probably follows out of the environmental policy and understanding of those times as well as of the fact that the social issue was of peripheral concern under conditions of centraly planned economy.

Social research was also made by the Institute of Radioecology and Utilization of Nuclear Technique in Košice within the project „Research of possibilities for complex utilization of nuclear energy in national economy and environment protection in given localities" whose one theme were „Sociodemographical and economic aspects of nuclear power plant construction". Methodology for economic evaluation of social impacts of construction and operation of the nuclear power plant was worked out by Koudelka (1985). However, this study is a mere information on the given issue. It indicates, nevertheless, that - taking into regard some actually social problems - the research team did a pioneer work. The era called for transformation of these social problems into economic terms.

The work clearly shows the then system of priorities. The first stage included economic aspects of the construction and operation of the nuclear power plant, the environmental viewpoint was added later on under the pressure of circumstances, and only in the end, there was a place for certain social considerations which, however, were to be converted into economic calculations in order to find arguments against the then technocracy. The social criteria were limited to two at the very beginning:

- *minimalization of the number of entities impacted by evacuation,*
- *minimalization of uncomfort issuing from the vicinity of the nuclear power plant (expressed by the number of inhabitants in 10 km surroundings).*

The research team of Koudelka also dealt with other phenomena such as formation of new communities at the place of mass construction of new settlements or temporary housing facilities, life style changes, and the like. Division of the individual issues was as follows:

- *sociological (close-down of existing communities and formation of new ones, integration of evacuated population into new communities, disturbance of human relations, free sex, change of life style and leisure activities),*
- *socio-psychological (defence mechanisms exhibited in e.g. aggression in individuals, negativism, psychopathic reactions, deviated social behaviour, restructuring of the hierarchy of needs and values),*
- *paedagogical (re-education of adults, education of children, requalification, the issue of illegitimate children, etc.),*
- *socio-pathological (criminality, alcoholism, prostitution),*
- *political (changes in political moral, demands for operation of political and government authorities, changes in organization of regions, area attractivness and the like).*

The above hypotheses were subjected to field tests and an attempt was made at their economic and non-economic evaluation.

2. Geographical characteristic of the area under study

As to its geomorphology, the region of the Dukovany NPP belongs to the Jevišovská pahorkatina (Upland) and to its sub-complex of Znojemská pahorkatina (Upland) which is characteristic of a flat relief. Individual plateaux are separated from one another by deeply incised valleys of the Jihlava, Oslava and Rokytná rivers. Typical are steep valley slopes. The Jihlava river formed numerous meanders whose greater part was flooded with waters of dam reservoirs Dalešice and Mohelno.

The slopes of the incised valleys are covered with coniferous stands with dominating pine and remnants of deciduous forests (oak, hornbeam, debris) which are typical of the local landscape together with denudated rock formations. There is a whole range of valuable geographical localities in the area, which were declared natural preserves or natural parks. As to climate, the area under study belongs to the mild warm and dry zone that can be characterized by long, dry and warm summer and short, warm and very dry winter seasons. Snow cover is very short and the average annual total precipitations amount to some 550 mm.

Colonisation of the immediate surroundings of the power generation system is of pronounced rural character. With the exception of four villages, all settlements are less than 500 inhabitants. The rural population shrinks similarly as in other marginal regions. In the last 25 years, the number of permanent residences and the number of permanent residents dropped by 12% and 19.1%, respectively. The majority of uninhabited houses was transformed into recreational objects owned by individuals.

The area under study does not rank with recreational areas of national significance. Yet, it belongs to the wider recreational background of Brno conurbation the distance of which is some 50-60 km, and it is a territory of short-term recreation for 35 000 inhabitants of Třebíč. The river valleys and the geographically unique serpentine steppe of Mohelno are sought localities for hiking and short-term recreation. The mentioned area was sought by tourists and the first summer house owners as early as in the second half of the 30's. This was the period of time when the first cottages and summer houses were built of which the majority disappeared under the water of present reservoirs though.

In the 60's, this was still a rural landscape that was changed into agrarian-industrial landscape after building the nuclear power plant. The complex of nuclear power plant became a pronounced dominant which cannot be incorporated into the surrounding landscape due to its size. Landscape aesthetics and perception were essentially changed. At the beginning of the 70's, the originally rural landscape completely changed its

appearances by enlargement of field units and removal of dispersed greenery. Thus, a monotonous rural landscape came into existence with civilization elements dominating over natural ones. Forest stands as a landscape-forming element mainly skirt river valleys and cover valley slopes of incised water streams.

There are two water reservoirs that were constructed on the river Jihlava in connection with building the nuclear power plant. A pumped-storage hydro-electric power plant was installed in the dam of Dalešice reservoir, which covers the peak demand for energy. The fact together with water being taken for the nuclear power plant cause a considerable fluctuation of water table and denudation of banks which is not good for recreational use of the area. Another adverse factor of local environment impacting population in the region is excessive noise from the military airport Náměšť-Sedlec.

3. Opinions of local self-governments and inhabitants

There were inquiries made in the region, whose results are presented in this part of the contribution. The research was anonymous and was made in two respondent groups: representatives of local self-government authorities, and inhabitants of the area under study.

The responding group of **representatives of local self-government authorities** consisted mainly of mayors and councilmen. Inquired were 50 municipalities. The investigation was made repeatedly in the Autumn of 1994 prior the communal elections (return of only 32%) and in February-March 1995 when the majority of municipalities in the area under study was addressed again and the return was 62% this time (ie. 31 returned questionnaires). The questionnaire for „decision" evaluation of opinions in the self-governed territory contained 24 questions which included following groups of issues:

- *evaluation of the opinion group percentage in the opinion scale in connection with the impact of the „works" on their social conditions and social environment, on assessment of influence of individual social indicators conditioning global approach in the individual groups of citizens and on possible environmental agents affecting these global approaches,*
- *evaluation of opinions of citizens as related to the influence of the „works" on natural environment of inhabitants in the area under study, on the conception of „environment" in awareness of the citizens, and on assessment of participation of organizations, institutions, interest groups or individuals at the creation and protection of local environment,*
- *evaluation of stratification and differentiation (growth of social differences) in the position of inhabitants in the village (both in economic and psychological context) in reflexion of the ongoing economic, political and social transformation, classification of reasons and directions of the differentiation, assessment of local development of private enterprising in the village as well as of the contribution of political parties to village prosperity,*
- *evaluation of the present structure of values in local population, the position of „utility activities of citizens" within this structure, and assessment of shifts within restauration of values, relationships and life style in the village (countryside regeneration),*
- *evaluation of the present situation and future development as to migration of inhabitants including the reasons for evacuation of villages.*

Although the inquiry was anonymous, the majority of villages mentioned their names and it was therefore possible to set up two territorially differentiated groups of municipalities defined by the character of the „work":

- *the problem micro-region of Dukovany-Dalešice: 27 municipalities were inquired - 16 of them (59.2%) responded,*
- *the problem micro-region of Náměšť-Oslavany: 23 municipalities were inquired - 15 of them (65.2%) responded.*

The research into opinions of **the population living in the area under study** was made through the regional newspaper **REGION T** to the date of 21 March, 1995. However, the people showed a minimum concern

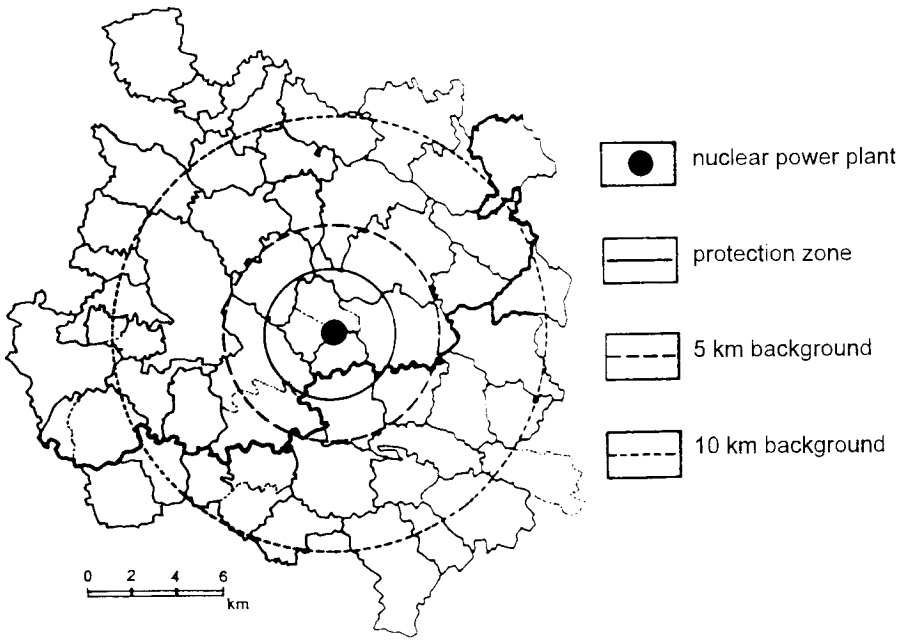

Fig. 3 Delineation of the nuclear power plant background

and the set contains only 27 respondents. Interpretation of results can thus be not considered representative but rather illustrative or expressing present trends. Nevertheless, participation in the public inquiry always demonstrates the measure of citizens, concern and their willingness to take part in the solution of environmental problems in their locality by at least having and expressing their own opinion.

The set was represented mostly by women (66.6%), persons with the secondary education (55.6%) and skilled workers (29.6%). In terms of occupational structure, dominating were administrative workers (22.2%), retired people, private entrepreneurs - natural persons, employees in enterprising subjects of both natural and legal entities (14.8%) and civil servants (11.1%). Average age of respondents was 40.8 years (of which only 18.2% of persons aged up to 30 years and the same percentage of retired persons). Nearly three quarters of them live in towns.

The questionnaire used was based on a form applied in a research of opinions on the level of local authorities, which was modified for anonymous public inquiry (adequately to possibilities of publishing in press). The inquiry contained only 9 questions and an identification block of data on the respondent. It was focused on approaches of citizens to consequences of the „works" in social and natural environment, significance of social environment indicators, system of values, approach towards the solution of potential unemployment, existence and influence of „social actors" in the town or village, and evaluation of participation of individuals or institutions in the creation of social and natural environment in the area.

3.1 Opinions of local population as to consequences of the „works" operation in social environment

a) Representatives of 31 municipal councils are of the opinion that 44.8% of inhabitants take a negative stand to the influence of the works on their social environment (23.5% unambiguously negative, 21.3% mostly negative). More than a third of inhabitants from the set of citizens (34.8%) admits positive impacts of the works operation on the social environment, 13.6% of inhabitants do not care about the impacts, and 6.8% of population assume that the works operation is of no social significance.

b) From the comparative point of view according to territorially delineated problem regions, there were differences in the evaluation of two fundamental impacts on social and natural environment: positive and negative. It was shown that a priority opinion group of citizens with adverse approach to the influence of the works on environment (46.6%) and at the same time, a significantly higher percentage (26.7%) of citizens with negative approach to the influence of the works on their social environment can be found in the region of Náměšť-Oslavany. In contrast, priority positive approaches to the consequences of works operation in their social environment (43.7%) were characteristic opinion of citizens living in the Dukovany-Dalešice region as well as less frequent approaches expressing negative impacts of works operation on natural environment (37.5%) as compared with the population in the Náměšť-Oslavany region.

c) Interesting appeared to be also the comparison of differences in the evaluation of approaches towards impacts of the „works" on the social and natural environments from the „decision" point of view and from the standpoint of inhabitants. Although the respondents from the group of citizens do not claim to be indifferent, the result can apparently be accounted to the fact that it was exactly those who are concerned with the issue that responded in the public inquiry. At the same time, they represent the opinion group with negative approach towards the influence of the works on both natural and social environments. It can be assumed that the frequency of the „decisive" view is more representative.

d) Conditional character of the opinions by indicators of social environment. Representatives of local authorities assume that reasons for global approach in the positive group (for which the works operation means an important contribution in the social area) are particularly based on labour market, level of income and living standard of inhabitants in the following order of the individual social indicators:

1. jobs available in the nuclear power plant,
2. higher income,
3. safe jobs and good prospects,
4. jobs in services and private businesses,
5. development of social infrastructure in the municipality,
6. good conditions for self-realization,
7. improved standard of living,
8. improved transport connections.

Major reasons for negative approach of the population are seen in impacts of the works operation on social aspects which are mainly of environmental character and their order is as follows:

1. adverse impacts on recreational value of the territory,
2. adverse impacts on (natural) components of environment,
3. adverse impacts on urban and residential structure.

In the case of comparison between the two groups of respondents under study, it appeared that the positive impacts of „works" operation are also seen by the citizen group in the area of labour market (77.8% citizens mentioned the indicator of „job opportunities at works operation") and the corresponding growth of living standard in persons employed at

the works (55.6%). However, a certain role is also played by social benefits provided for the employees (59.3%) as well as availability of flats built up in connection with works construction (51.9%). On the other hand, no positive influence was seen by this group of respondents on transport connection and development of opportunities for self-realization of inhabitants. The negative approach of the citizens to the works operation concerns impairment of environment (77.8%), impairment of recreational possibilities in the area (74.1%), and impairment of human relations (40.7%). Nevertheless, the group of citizens - in spite of expressing mainly negative attitude to the works operation (59.3%) - much more frequently speaks of individual positive social indicators rather than negative ones in the structure of reasons for their general approach. In comparison, the group of local authority representatives assumed the total of 58.6% positive impacts and the group of citizens 68.9%. It seems therefore that the „environmental" negative consequences have greater influence on the resulting attitude than specifically social consequences that are in fact produced by the „works" operation.

e) Possible negative impacts on social environment quality in the village were analyzed in connection with the migration of labour power needed for the „works" operation. The total of 89.3% municipalities did not mention any social problems. In 16.1% of cases, the inflow of new labour power caused insufficient housing possibilities for local inhabitants, insufficient services, unsuitable changes in transport connections, impaired job opportunities for women (wives of workers at the NPP) and no job opportunities for people with low skills. Price drop of immovables in the region and its secondary social effect should not be overseen either.

f) In connection with the saturation of needs for work engagement of inhabitants in the region, the approach and willingness to independently find a solution in the case of possible loss of job were studied in the group of citizens. It showed that 51.9% citizens do not exhibit too much fear (this was probably conditioned by non-representative character of the group and its structure) since 37.1% of them were certain as to finding another job in the vicinity of their abode and 14.8% had absolutely secured jobs. 11.1% of the jobless would start a business, 7.4% might move outside the region to get another job, 7.4% would make use of the labour office, and 22.2% would not be able to find any solution to the situation or were already in the post-productive age.

g) No significant coincidence was revealed between the background of citizens, attitudes and the action of interest (lobby) groups at the local, regional or supra-regional level or mass-medial or mass-psychological influences at studying other effects of environment that influence the global attitude of citizens since - according to the local authority representatives - nearly 70% of citizens form the approach of their own mainly on the basis of their own experience.

3.2 Opinions of local population as to consequences of the „works" operation in natural environment

a) In the group of local authority representatives, the environment is understood as a factor affecting peoples health (61.3%), as a complex category including the links among natural, technical and social factors determining sustainable living conditions for inhabitants in the region (19.4%), and as nature protection (16.1%). The conception is very much different from that in the group of citizens where a system viewpoint is preferred (55.6% of respondents), environment is felt as a synonymum of nature and landscape protection (25.9%), and closely related to the health of inhabitants (18.5%).

b) Results indicated by the local authorities show that as to the influence of the „works" on environment in the village and its surroundings the citizens take clearly negative approach (36.4%), mainly negative approach (17.0%), 19.2% of citizens do not assume

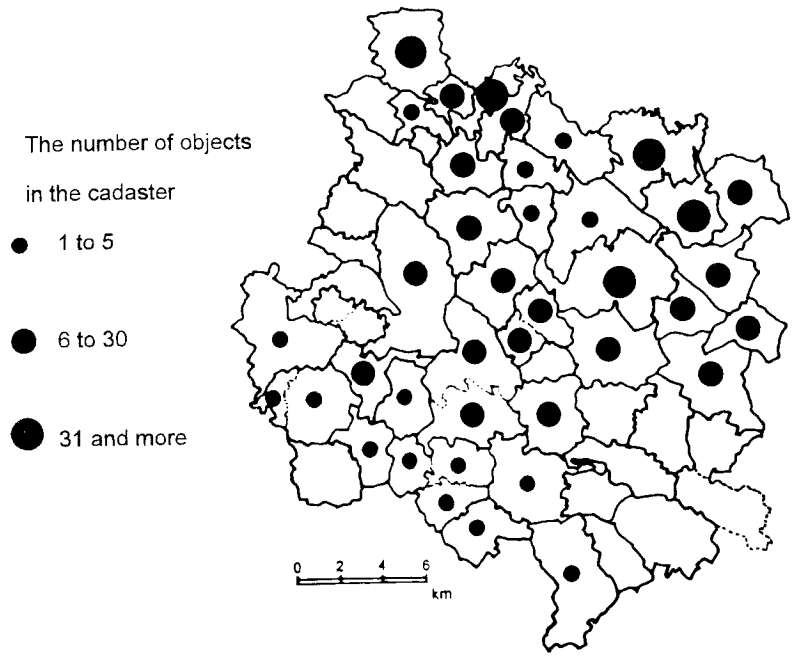

Fig. 4 Individual summer houses in 1971

the environmental impacts important, 13.7% of citizens feel indifferent to the consequences, and 13.7% have mainly positive approach (adverse e ffects on environment are sufficiently compensated by positive influence on social environment). The most important components of environment for the group of citizens are as follows: value and aesthetics of the surrounding landscape (33.3%), ie. natural profit for inhabitants), clean water (26.7%), clean air (31.1%), less important seems to be the peaceful and silent environment (8.9%).

3.3 Profitable budgeting of municipalities thanks to existence and operation of the works in the area under study

The total of 74.2% respondents from local authorities claim that in addition to the valid system of taxes their budgets are being contributed to from the Fund of Environment, supporting regional programmes, sponsoring (mentioned as „gifts") by the Dukovany Nuclear Power Plant and Czech Power Engineering Corporation (ČEZ) as well as from financial subsidies provided to municipalities associated in „Energoregion". For 16.1% of municipalities the funds in connection with the „works" operation are still not available but are expected to arrive soon, 9.7% of municipalities do not get the funds in this way and do not expect to get them in the future.

3.4 Summary

The research showed that consequences of operation of large technical and power generation plants in natural and social environments significantly and by a different way condition opinions of population in the region under study. The largest group of citizens (both from the viewpoint of councilmen and actual inhabitants of the territory) take a generally negative approach to the consequences of „works" operation in natural (53.4%) and social (44.8%) environments, 59.3% of respondents from the group of local inhabitants feel endangered by the „works" operation.

However, the opinions differ by the defined territorial criterion. Inhabitants of the Dukovany-Dalešice microregion incline more often to positive approaches due to beneficial developmental impacts of the „works" on their social situation (43.7%). In contrast, inhabitants of the Náměšť-Oslavany region show generally negative approaches due to unfavourable impacts of the „works" on natural environment (46.6%) that are not sufficiently compensated by the generation of favourable impacts of the „works" operation in social environment as in the region of Dukovany and Dalešice.

The two groups of respondents have a different awareness of „environment", too. Environment is understood to be a category related to the health of population in the groups of councilmen (61.3%), and a complex category including natural, technical, economic and social factors in the group of citizens.

It has appeared that the reasons which condition the general positive approach of a citizen can be found in the social area. This is first of all the influence of the „works" on labour market in the region (job opportunities, secure jobs and good prospects, self-realization), on economic functions of living background of inhabitants (ie. contribution of the „works" to better income, improved living standard, social stratification namely in employees at the „works", etc.), and finally also the positive consequences of construction and operation of the „works" in the area of civil and technical infrastructure of municipalities in the area under study.

Reasons for negative opinions are either of the purely ecological character (contamination of natural environment, water, air, noise and the like), or they concern living environment of people (impaired recreational value of the area, unfavourable consequences for aesthetics, landscape formation and urban and housing structure of the area).

The labour inflow for job opportunities at the „works" caused social problems only in 16% of municipalities (e.g. pressure on flats, lesser employment possibilities for originally settled women, unfavourable changes in transport structure, dropped prices of real-estates). On the other hand, it helped to relieve or stabilize evacuation processes in some 42% of municipalities. Villages that anticipate future continuation in the process of evacuation of their inhabitants (38%) are not situated within the nearest vicinity of the „works" and at the same time, these villages exhibit insufficient or minimum development of private enterprising with some 1 to 3 enterprising legal or natural entities in the village, and the absence of supporting funds in the municipal budgeting in connection with the „works" opration. The reasons for evacuation are seen mainly in the insufficient social security of village inhabitants (security of job and income), impairment of social and technical infrastructure, increasing costs for transport to work, unfitting transport system, and psychological effects following out of worries about the health of inhabitants and natural environment in this ecologically loaded area.

With regard to the resulting general attitude of local population it can be expected that more important are ecological and environmental consequences of the „works" operation than favourable products of the „works" of social nature, which seem to be received as a matter of course and are more frequent. However, there is no evidence so far that this resulting approach of citizens was manipulated by for example „lobby" groups or massmedia.

And again, the activities of institutions, organizations, political parties, enterprising subjects or individu als at the protection of environment and development of prosperity in the individual municipalities are evaluated

in a different way by the two groups of „councilmen" and „citizens". Three quarters of respondents from the „citizens", group do not consider these activities to be important (or they even do not know about them). In contrast, two thirds of the „councilmen's" group of respondents admit some beneficial activities on the part of an interest association in the village and the local authorities. In this connection, it is necessary to mention that some 14% of local population feels indifferent towards possible ecological and social impacts of the „works" and approximately 16% of local inhabitants are not prepared to take any active part in the development or protection of environment at all, and in 55% of the case there only a few same enthusiasts who are prepared for the action. At the same time, 23% of respondents assume that their village either actually misses a „social actor" (anybody with appropriate social or economic position, a personality, an authority with good influence on inhabitants or village proceedings), or the personalities in the village act one against another, against concerns of the village, or have a rather negative influence on citizens and human relations in the village. In municipalities that report such a personality, it is usually the mayor (evaluated from the viewpoint of the „councilmen's" group of respondents).

The facts are further confirmed by the finding that some 71% of villages in the area under study cannot yet speak about starting the process of „village regeneration" (regeneration of ways and values of country life, the feel of integrity and good neighbour relationships) and, in contrast, can bring an evidence of things going to the worse. The results are supported by findings in the group of councilmen about the quality of human relations in the structure of values being ranked at the position before the very last one and the need of utility activities in the village on the very last place. Should we abstract from the priority position of the group of values such as „health and family", the most important thing in the lives of people become „money, property, rank".

The growth of social unequality (differences in income and standard of living) in some social groups in the village was mentioned by 68% of respondents from the group of „councilmen". This applies mostly to enterprising subjects of natural persons who self-employ themselves and members of their families in agriculture, trade and building industries, possibly also to managers in legal entities (including the Nuclear Power Plant).

The picture of developing business in the villages is not favourable. In some 45% of them, enterprising develops very slowly since the very beginning of transformation, and only a quarter of the villages consider the pace of development even. The most frequent form of enterprising are private businesses of natural persons with the average of 0-21 employees in the whole group of villages under study.

4. Recreation in the surroundings of the Dalešice water works

Geographical conditions for recreation and both the structure and location of recreational facilities were evaluated at the research of recreational potential in the surroundings of the Dalešice water works. The public inquiry meant for owners of individual recreational facilities was made in summer of 1995 in order to record present utilization of the recreational facilities and subjective opinions of owners on the presence and operation of the nuclear power plant in their recreational area. There are 1041 objects of individual recreation within the ten kilometer background of the nuclear power plant. This means that there are some 4000 persons spending regularly their leisure time here (voluntarily - in contrast to the local population). Results of the research can be used to compare perception of the nuclear power plant in permanent residents and those who arrive just for recreation .

The main area of interest for the research was defined by the cadasters surrounding the complex of the nuclear power plant within 10 kilometers and the defined area was further subdivided into two parts: the closer area within 3-5 km from the plant (with the protection zone of 3 km being completely without any dwelling

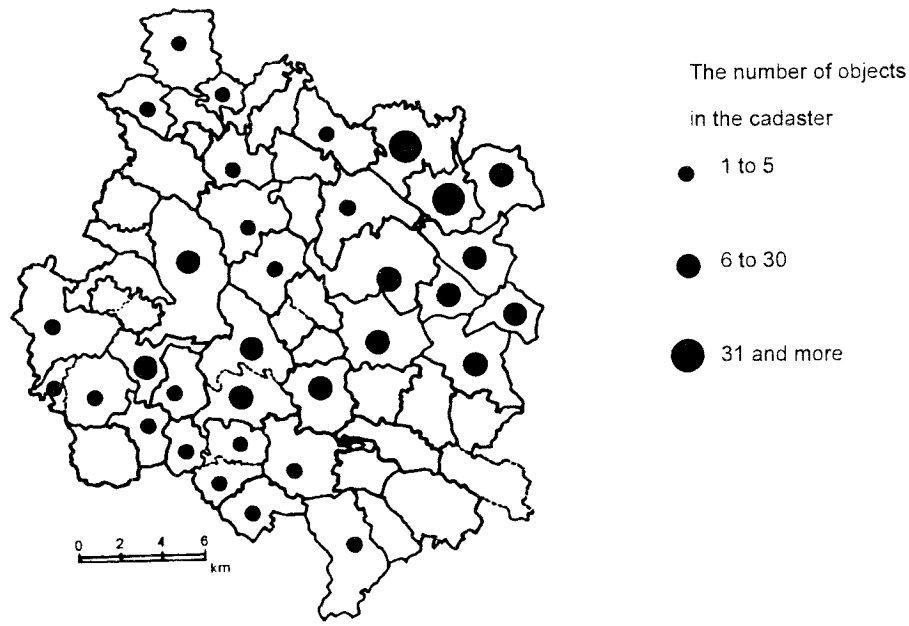

Fig. 5 Individual summer houses in 1995

houses) and the more distant area within 5-10 km. There are 6 villages (7 settlements) and 26 municipalities (28 settlements) in the internal and external background of the power plant, respectively.

Beside the defined territory, the research was made also in cadasters of several other municipalities situated within 10 to 15 kilometers from the nuclear power plant. The area was originally planned for building of new individual recreational objects in order to replace those liquidated during the construction of dams or the nuclear power plant (3 km protection zone). The investigation included the cadasters up to 15 km of distance in the case that they were places concentrating a greater number of cottages and summer houses.

The public inquiry contained 29 questions which focused the following groups of problems:

1) *time of construction of recreational facility and its technical infrastructure,*
2) *general perception of the landscape, opinions concerning the existence and safety operation of the nuclear power plant,*
3) *sales competitiveness and realistic prices of recreational facilities on the market with real-estates,*
4) *ways and frequency of utilization of the recreational facilities and changes on their utilization in the last five years due to new economic conditions,*
5) *relationship between the holiday-makers and the local population, utilization of services in villages and the way of transport to the recreational area,*
6) *future utilization of existing recreational facilities including possibilities of their use for permanent residence.*

The group of respondents consisted of heads of households in the recreational facilities. Most numerous were respondents beyond 60 years of age (39%), and two groups of respondents in the categories of 51-60 and 41-50 years of age, respectively (each of 25%). The group of respondents falling between 31-40 years of age amounted to 8%, and only 3% of them were younger than 30 years. The most frequent group in terms of education was represented by respondents with secondary education (44%), skilled persons (33%), university graduates (19%), and 4% were persons with only primary education. As to professional structure, the group included 43% of retired persons, 22% employees in state enterprises, and 22% of employees of private companies. Self-employed persons (natural persons) amounted to only 10% and persons working in agriculture (members of agricultural cooperatives) only 1%.

The acquired set was divided into three groups by the distance of responding recreational facilities from the nuclear power plant as follows: respondents living in the closer background (3 to 5 km), respondents living in the more distant background (5 to 10 km), and the third group that was represented by owners of recreational facilities localized in the distance of 10-15 km from the nuclear power plant. All subgroups were then divided into owners of cottages and owners of summer houses. In the presented paper, this differentiation is observed only in cases when the responses differed either by the criterion of distance from the plant or by the character of the recreational facility (cottage, summer house). The inquiry was made in more than 15% of owners of recreational facilities, which can be considered a representative sample.

4.1 Present recreational use of the area

The delineated background of the nuclear power plant contains mainly objects of individual recreation, summer camps for children and young people, and exceptionally also recreational facilities of former state enterprises. There are only a few facilities that would fall into the category of „free tourism" in the area. The largest facility for mass recreation is the camp at Hartvíkovice, situated on the left bank of the Dalešice dam lake. The camp has a standard equipment with no hot water supply neither central kitchen, with 39 permanent beds in 13 cabins and a relatively large open area for tents and caravans. The camp os some 8 km distant from the nuclear power plant and in spite of this fact, it is usually fully booked in summer months. All this thanks to beautiful natural surroundings, bathing possibilities on a well maintained beach, a dense network of marked tourist paths in the very immediate vicinity, numerous cultural sightseeings and natural beauty spots in the wider background (castle in Náměšť nad Oslavou, Kralická printing shop - a medieval printing shop in which the first bible in the Czech language was printed), the serpentine steppe at Mohelno with a typical meander right below the steppe. Other localities used for summer recreation are public campings near Mohelno and at the Stejskal lake (Rouchovany cadaster).

Although the research was focused on the study of recreational utilization of facilities for individual recreation, the research team made a public inquiry also in the Hartvíkovice camp which is being visited by holiday-makers from the whole Czech Republic but mainly by those from the districts of Brno-City, Brno-Province, Třebíč and Žďár nad Sázavou. The camp operator recorded some 500 thousand overnights in the camp in the summer season of 1995. There are many guests who come here every year the reason for their repeated comeback being mainly the beautiful surroundings. It is in this locality where the majority of holiday-makers do not consider the fact that there is a nuclear power plant in the close vicinity to be important. The phenomenon is apparently psychologically conditioned as the power plant cannot be seen from any place in the close vicinity. On the other hand, the majority of the guests complains about the near military airport at Sedlec near Náměšť nad Oslavou that impairs the given locality with excessive noise.

There are practically no hotels, guest houses or temporary accommodation facilities operated through-

out the year in the area under study. A larger capacity of some 60 beds can be found in the guest house situated in the former castle at Dukovany. Although the guest house has a standard equipment, it is used as a temporary accommodation facility for construction workers employed in the microregion. There are abundant summer camps for children in the area of which the largest ones are situated in the cadasters of Biskoupky, Mohelno and Rešice. However, the camp at Biskoupky has been out of operation for economic reasons already two years. The recreational facilities of former state enterprises are being commercially used at present (being either sold or rented).

Since 1970, ie. since the construction permit for the power generation complex Dukovany-Dalešice), there have been many changes in numbers of recreational facilities for individual recreation. 280 private recreational objects were demolished in the flooded area of Dukovany and Mohelno and in the protection zone of the nuclear power plant. To compensate for these, two other localities at Koněšín and Kozlany were predetermined for new cottages and chalets. It was expected that there will be more than 800 private summer houses erected in these cadasters and some 250 chalets to rent at Hartvíkovice. The cadaster area of Kramolín was to become a recreational center for the so called „company recreation" (Foretová, 1977).

However, the reality is more sober. The total of 126 private summer houses were built at Koněšín and Kozlany, and there was no construction of chalets to rent at all at Hartvíkovice. Yet, the number of summer houses increased in the studied area from 1975 despite the presence of the nuclear power plant. In some recreational localities, the building has been going on at present. However, its extent is much lesser than originally anticipated. According to the statistic data from census of people, houses and individual apartments, there were 1041 recreational objects for individual recreation within the ten kilometers' background of the nuclear power plant, of which 573 were summer houses and 468 holiday cottages.

4.2 Results of public inquiry

The time of acquisition of the recreational object in the loaded area is essential as related to the study of respondents opinions concerning the nuclear power plant as well as to the study of changed values of the local landscape. The total of 40% respondents were owners of recreational facilities in this area before the year 1970 (ie. prior to the construction permit for the power generation complex). Of these, 5% of respondents had to sell their summer houses to the municipal authorities due to the construction in order to build new ones in newly built recreational localities (mainly at Koněšín and Kozlany). In 1971-1975, ie. roughly until the time when the construction of the nuclear power plant was started in 1974, 11% of respondents acquired recreational objects in this area. In the period of time before the first unit was phased in (1984), there were other 36% of respondents who acquired recreational facilities here. The remaining 13% acquired their holiday cottages and summer houses already at the time of power plant being operated. These data indicate that nearly a half of the inquired respondents acquired the recreational facility in this area being well aware of the nuclear power plant existence. In the cottages, the research team recorded only the year and way of their acquisition. 35% of the inquired were given the cottages from their parents. In these cases, these people are local countrymen with feelings to the given area. The remaining 65% of respondents bought the cottages from their original owners. There was no case of a repeated purchase and sale of the cottage within the public inquiry.

Technical equipment of recreational facilities (electricity, water supply, elimination of sewage water and waste) is at a very low standard. The majority of summer houses are situated outside the intravillan of municipalities, which means that building of technical infrastructure would not be economical and in some cases technically hardly feasible. Technical infrastructure of cittages corresponds with the installed technical infrastructure of municipalities. Relatively best seems to be the connection of recreational objects to the electrical energy distribution network. All cottages in the area

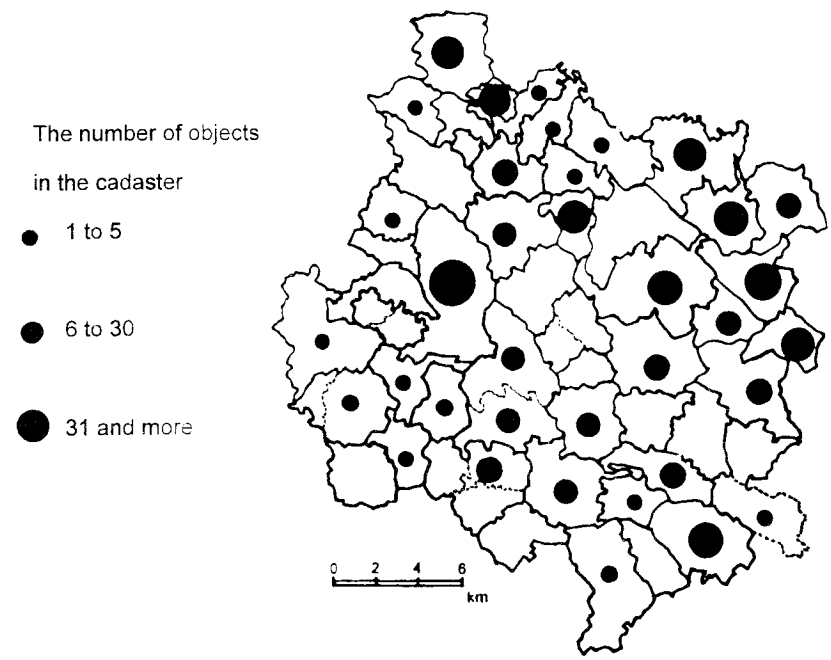

Fig. 6 Individual summer houses in 1991

under study are connected, ie. 33% of all facilities for individual recreation in the studied area. On the other hand, only 22% of summer houses can make use of advantages of being connected to the power supply with regard to their location. However, some of summer house owners generate electricity by means of diesel aggregates mainly at localities where electrification of holiday colonies had originally been planned.

Supplies of the recreational facilities with drinking water is very difficult. There are only 25% of them supplied from the public water supply system, other 5% make use of their own or public wells, and the remaining 70% objects do not have any running water. The group of cottage owners indicates better water supply with 60% of them being connected to running water (of whom 73% are connected to the municipal water supply system, 18% have a waterpipe connected to the local well, and 9% dispose of a pipeline connected to the well of their own), 37% of the cottages have a water source of their own - a well (46%) or a public well (54%), and 3% of the cottages are with no water supply and water must be brought in from a distance.

Water supplies to the summer houses are much worse. Running water is available to only 11% objects (of which 63% and 47% make use of the public and own well, respectively), owners of 74% summer houses make use of non-running water from the public or own well (93% and 7%, resp.). The remaining 15% of summer houses do not have any source of drinking water available and the water is being brought either from the place of permanent residence or from the public well in the nearest village. This applies to summer houses situated in valleys of water streams where water from the stream is used for utility purposes.

Possibilities of sewage water elimination correspond with water availability in the recreational objects. 12% of them are connected to the local sewage system (ie. some cottages situated in intravillans of villages with established sewage systems), 45% of the objects have a septic of their own, and the remaining 43% do not have any adequate liquidation of sewage waters available. The majority of recreational facilities have a dry WC and - with regard to the problems with water supply - also a minimum water consumption.

The way of solid communal waste elimination is mostly individual (82%). The half-a-year waste collection was contracted by 8% owners, and 10% of the owners went for an annual waste collection contract, which mainly applies to the cottage owners in municipalities with organized collection of solid communal waste). Neither in the immediate nor farther vicinity of the individual recreational facilities in extravillans of villages we could see wild dumps or any kind of mess. We found only clean places and even the forest cleared of debris and fallen trees.

Perception of the local landscape as a whole. Owners of recreational facilities in the inquired group include in their perception of the „surrounding landscape" mainly the river valleys (even in the case that the rivers or water streams do not pass the cadaster of village, in which their own facility is). In the case of summer house owners the finding is connected with localitation of the objects usually in attractive river valleys. The same evaluation was found in the cottage owners whose objects are situated in the intravillans of villages. However, under the term of landscape they do not mean the village and its immediate surroundings but again the landscape parts around water streams. In addition, an approximately half of the cottage owners are local countrymen who are bound to the area with their youth. The wider perception of the „landscape" is also reflected into their answer to a question whether they would again would like to have a recreational facility in the same area. The presence of the nuclear power plant is of the secondary importance.

Perception of nuclear power plant existence and a feel of potential jeopardy. As it was indicated by the research, this is a psychological problem which does not depend on education or age of respondents. It followed out of the public inquiry that the feel of danger drops with the increasing distance, important being also the fact that the inquired persons identified the power plant with the cooling towers rather than with the proper facility operated. There were 32% of respondents in the whole set who had a positive answer to the question if they have an unpleasant feeling of being endangered by a potential breakdown. The feeling was not shared by 66% of owners and 2% of respondents could not make their decision at all. 50% respondents in the 5 km distance from the nuclear power plant feel a certain risk. In the distance of 5 to 10 km and 10 to 15 km it is 45% and 24% of respondents, respectively. At evaluating replies to this question it is necessary to bear in mind that the majority of owners of recreational facilities have their permanent residence in the districts of Třebíč, Brno-City and Brno-Province, ie. in the wider background of the nuclear power plant. This means that these people feel the potential risk even in their permanent residence and consider it to be a constant fact.

There is a general awareness within the broader surroundings of the nuclear power plant that the recreational facilities situated within this background are not marketable at all or available to sales for only a price which does not correspond with their market value. The research confirmed the presumption only to some extent.

All holiday-makers are content with the environs of their summer house and have no intention to sell it. The majority of them assume that their facilities would be well marketable in the case they wished to sell in spite of the fact that many of them have no electricity or a source of drinking water of their own, and sometimes

even the access is difficult to them. According to the opinions of owners, the difficult access would even contribute to a better price at possible sales. The good competitiveness and realistic market price are corroborated also by summer house owners who acquired their facilities here after 1990.

On the other hand, the opinions concerning possible sales of the cottages reflect the presence of the plant very clearly. In contrast to the summer house owners, the cottage owners are convinced in their majority that they would have problems not only with the sales but also with the market price of the real estate. It remains a question, however, what role would be played in these cases by the insufficient technical infrastructure. With regard to non-attractiveness of village intravillans, their poor technical infrastructure, insufficient services and ever worsing transport accessibility, the nuclear power plant is the last argument for poor marketability of immovables.

Although there were many changes made in the area under study in the last two decades, the local lan dscape is still very attractive for short-term recreation and hiking. It seems that the construction and operation of the nuclear power plant were not the reason to any limitations in recreational use of existing facilities. Nevertheless, the idea that the Dalešice dam lake will become an important locality for summer recreation did not come true.

Nearly two thirds of owners of recreational objects are over 50 years of age. The recreational facilities are being used not only by themselves but also by their married children and their families. Thanks to the „second domicile" the population within ten kilometers around the nuclear power plant may rise by 4 000 in the summer season. With some exceptions, there are no friction planes between the communities of local inhabitants and owners of recreational facilities. A great majority of respondents mention very good relations with the local population and local authorities, feeling appurtenance with village communities.

The majority of recreational facilities lack the corresponding technical infrastructure and their owners claim them not to be fitted for permanent residence (no running water or even the source of drinking water, no elimination of sewage waters and solid communal waste, no electricity in some cases). It is therefore not expected that these facilities would contribute in helping the permanently decreasing population in the area. On the top of it, the owners of recreational facilities cannot be counted with at economic and social transformation of the villages. The respondents - owners of former farms with agricultural land, do not consider any economic activities in this field. On the other hand, it is worth mentioning that the cottage owners contribute to better appearances of villages by maintaining their own recreational objects, and the summer house owners to the maintenance and cultivation of those part of the landscape, in which their summer houses are located.

To the owners of individual recreational facilities in this area the nuclear power plant is an unavoidable evil that has to be but accepted, 35% respondents feel worried about the potential breakdown. The percentage of worrying respondents decreases with the increasing distance from the plant and is greatest among cottage owners within 5 kilometers from the power plant, which can well be attributed to the adverse opinion of local inhabitants. However, even these respondents like the surrounding landscape. 54% of the inquired gave a positive answer to the question whether they would again go for a recreational facility in this area. 32% of respondents - mainly cottage owners - gave a negative answer with the nuclear power plant not being the main reason, though. The public inquiry further indicated that the responding owners of summer houses do not consider possible sales of their recreational objects. This kind of thinking was rather found in cottage owners but even here the main reason is not the existence and operation of the power plant.

5. Future prospects of the region

Technology used in the Dukovany nuclear power plant calls for a great number of skilled workers as well

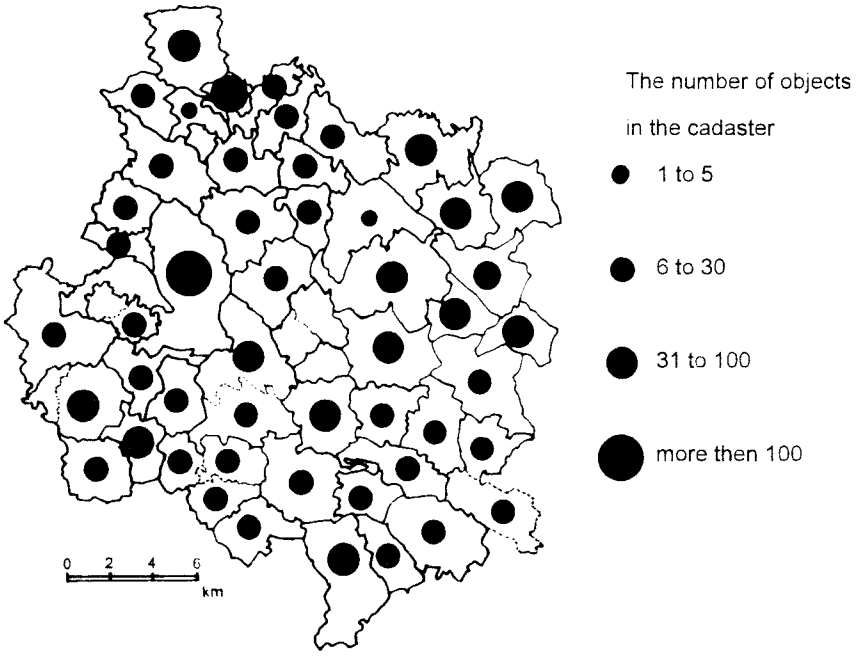

Fig. 7 Total number of facilities for individual recreation in 1995

as well educated and experienced technical and operational personnel. The fact induced expectations of some changes in social environment of the region which has been affected by this huge technical work. Yet, the original plans could not take into consideration the transformation changes which have been going on in the Czech Republic since 1990. These changes have influenced the present situation in the region to considerable extent. It seems that the impact of the transformation changes is more important for the majority of villages than the issue of the nuclear power plant, which is given the secondary importance. Exception may be the village of Dukovany itself and recreational areas or villages in the near vicinity.

An area with the greatest concentration of housing facilities is that of Třebíč where the nuclear power plant became the most important developmental stimulation. Some more important construction was made within the immediate vicinity of the works. However, the building activities reflected in the liquidation of some buildings and recreational facilities.

The general situation in the region corresponds with the problems of transformation in this type of territory. Prospects of agriculture in the region are foggy, there is no firm conception of labour recruitment in the area, the tertiary sector is underestimated, transport accessibility by means of public transport goes worse, and the enterprising activities of local population are insufficient.

Social impact of the power plant - viewed from this point - is objectively rather beneficial since the technological procedure applied does not allow greater migration of labour power which makes the power plant a stabilizing factor for labour in the whole region. Employment in power generation industry helps to maintain purchasing power of the local population, which may stimulate development of services should the local inhabitants be capable of responding to the challenges. The positive social influence of the nuclear power plant is being recognized partly also by the local population.

There is no doubt that the recreational function of the landscape were impaired. However, negative seems to be rather the subjective effect of the plant than actual danger. This can be documented by the results of public inquiry, which indicated that it is mainly the aesthetic impact of its silhouette in the landscape that matters most. In other words: recreational value of the landscape was impaired within a direct visibility of cooling towers. In this connection it is worth mentioning that the power plant is many times identified by many people with the cooling towers that usually dominate the landscape rather than the process of nuclear reaction itself or the process of power generation. Noise of aircrafts from the military airport at Sedlec u Náměště is objectively and subjectively much worse for recreation and permanent dwelling.

Recreation will not develop by expanding construction of summer houses but rather will be used the existing housing facilities for cottages. However, a considerable barrier to any development of recreation is the absolutely insufficient technical and social infrastructure of both permanent settlements and summer house colonies. It is therefore quite logical that there is a tendency in holiday-makers of higher age categories to return to towns with medical and social service and retail network of higher standard. Any further development of recreation that would bring finance into the region is conditioned by considerable improvements of the infrastructure.

The population in their majority feels endangered by impacts of the nuclear power plant on natural environment. However, it would be rather difficult to quantify the significance of this opinion with regard to the list of preferences in the population. The found out data do not indicate that the feel of danger is so high that ot would make the inhabitants think of moving into another region. Neither the majority of holiday-makers think of leaving their recreational facilities in the surroundings of the nuclear power plant. It should be mentioned, however, that the change in domicile is neither easy nor usual in the Czech Republic. Nevertheless, the fact is that the camp at Hartvíkovice, not far away from the plant, is rather well-off.

It follows from the above that the population feels a certain negative relation towards the power generation complex of Dukovany-Dalešice that is to a certain extent justified. A percentage of it, however, is prepared to recognize beneficial influence of the power plant on well-being of a wider area. Intensity of the negative relation does not reach values which might become a serious social problem. It is assumed that activities of non-governmental organizations against the nuclear power plant usually do not originate from the local population since - as it was said before - the most important items in the hierarchy of values for the local population is money, property and a good rank.

A far more visible problem in the region is the capability of its population and self-government authorities of coming to terms with all consequences of transformation and providing good prosperity for their villages. It was found that the programme of village restoration had not been even started in the majority of municipalities in the region under study. There are even signals that the municipalities feel somewhat uneasy about the development of enterprising. The existence of the nuclear power plant for communal development and for support of local businesses and enterprising is utilized to minimum extent.

The research of marginal regions indicated that human factor is entirely decisive for their present and future prosperity. Objective conditions of the territory and financial situation are of the secondary importance. The main barrier is seen in the insufficient awareness

of the local population, the fact which is usually conditioned by two following factors:

- *reduced percentage of people with good skills and qualification in population structure,*
- *traditional mistrust of innovations in the marginal social environment.*

In both cases the nuclear power plant plays a favourable role since it helps to considerably increase numbers of highly qualified people who work on the basis of advanced technologies. Workers in the plant bring their families into the area, whose qualifications are also higher than the average because qualification has a faculty of self-reproduction. The problem consists in the fact that these people are concentrated in Třebíč and the rest of the region could not yet find a way of how to make use of their potential.

A principal idea for regional prosperity in the present situation is to make use of local resources. Should the local conditions include serious disadvantages, it is necessary to find methods how to use these disadvantages to the benefit of the region. This fully applies also to the power generation complex of Dukovany-Dalešice. Economic power of the corporation as well as qualities of its employees bring to the region the potential necessary for future prosperity. Villages in the region should focus their activities onto cooperation with the company which can be the first to help in improving technical infrastructure. This is an elementar precondition for development of small and medium-size businesses.

6. Discussion and conclusion

Environmental risks accompany the mankind throughout its existence. When the man lived in caves, he was endangered by hunger, diseases, predators, natural disasters. With the developing science and technique the danger of natural risks is reduced. On the other hand, the significance of anthropogenic risks has been increasing. This is the price that we have to pay for technical progress. One of these risks is undoubtedly nuclear power engineering. However, the risk presented by the industry is neither the only nor the most important technogenic risk surrounding the man in general, and the man in vicinity of a nuclear power plant in particular.

Realistic measure of risk represented by nuclear power generation industry for instance in comparison with the use of a car can be relatively easily calculated. It is obvious that both in absolute and relative conception, driving a car comes out as an activity which is much more hazardous to the environment both from the viewpoint of its consequences and in terms of possible accidents. And, there is a cruel experience for the mankind from consequences after the nuclear bomb was thrown onto Hiroshima as well as from the breakdown of the Chernobyl nuclear power plant (Vaishar, 1993). The consequences were monstrous not only for the number of victims but for the fact that they impacted a single place within a relatively short time and with reduced options of individual choice. It is usually the individual who makes a decision about using the car and the government who decides about location of a nuclear power plant or use of a nuclear weapon. Here, we arrive at the problem of risk perception.

It is most probable that it is aircraft passengers rather than car passengers, who feel a certain risk although the aircraft is in fact a safer means of transport. It is because aircraft accidents have wider publicity in mass media than those of cars, and also thanks to the fact that nearly everybody can drive a car whilst there are a few to pilot an aircraft. This is why there are only a few serious estimates of the realistic measure of hazard in the aircraft. And it is very similar with the nuclear power plant. The reason for sensitive perception of the nuclear risk is both the wide publicity spread by mass media and non-governmental organizations, and poor knowledge of the used technology. In comparison with other serious environmental problems in the Czech Republic such as storage of conventional wastes, it is necessary to consider the actual concern of these movements against the nuclear power plant and whether they are interested to really find a solution to the issue of just to make themselves more visible.

There is no doubt that the population in the vicinity of the plant is at the risk. The question stands, however how much the people living here are willing to add this hazard to other dangers surrounding them, which are often even more risky. What is a realistic choice for these people? They can certainly move into relatively safer places and they can come to terms with the existence of the nuclear power plant in their locality. In the latter case, an adequate approach could possibly be seen in certain compensation measures that the local population would require in order to improve the standard of living.

An alternative to nuclear power plants can neither be seen in restoration and expansion of classic heat generation plants nor in utilization of non-traditional resources that are limited in our country and restricted to relatively short and irregular time periods. The only alternative possible is to save electrical energy. However, this would be contradictory with the present trend since the consumption of electrical energy shows a dramatic increase. On comparison with the first half-a-year of 1994, it was increased by 5.3% in the first half-a-year of 1995. First time in the last few years the imports exceeded exports. According to an analysis made by ČEZ, the main cause consists in a relatively favourable price of electrical energy for heating households. To reduce the consumption in market economy would mean to raise the price. Thus, those who demonstrate against the nuclear power plants demonstrate in fact for higher prices of electrical energy. Nevertheless, reduction of consumption is very much desirable, and it should be achieved through restructuring of production and transfer to energy-saving technologies rather than

via increasing prices and restricting consumption in households to the detriment of their living standard.

Intention of this study does not consist in finding a new strategy for power generation and supplies. The most essential fact is that any stoppage of nuclear power generation in the future years would be unrealistic. But the technology calls for storage and transportation of both active and burnt nuclear fuels. We attempted at a schematic outline of how the social system responds to these facts and tried to include other marginal problems of the region under study. The citizen should be informed of actual risks associated with the operation of the nuclear power plant, and also their weight within the set of other anthropogenic risks. This knowledge should serve for a decision whether he or she are prepared to bear the risks, possibly for defining their price and negotiate the price with representatives of power industry and government.

Perception of environmental risks by common population is a great problem of present environment protection plan. This study has brought an evidence that people perceive mainly visible risks with direct impact on them, and in particular the risks impacting their comfort rather than their health. Willingness of people to commit themselves in the issue is generally poor and so is their preparedness to pay more for environment-friendly products, for elimination of wastes or energies.

On the other hand, there are only a very few environmentally oriented non-governmental organizations with positive influence in the process of recognition of serious environmental issues. It is because they mostly overestimate nature protection and underestimate reasonable utilization of the nature, calling for the solution of consequences and not for the solution of phenomena. It is often a case that these initiatives advocate projects or strategies that are adverse to environment: when advocating other than nuclear power generation sourse, they also advocate the longer effect of coal burning power plants on air pollution, or their fight against motorways multiplies negative impacts of road traffic on existing communications. They often fail to convince other people when for example an environmentalist with a cigarette in his hand tries to explain the principles of fight for clean air. One cannot help a feeling that events of some environmental initiatives are funded by concrete commercial or political groups.

It is obvious that the Czech Republic needs a good conception for the sphere of environment. The AGENDA 21, accepted at the world conference in Rio de Janeiro is being considered an important document in the majority of countries in the civilized world, whilst it is a mere marginality in Czech conditions. Envidonmental education is an integral part of environment protection. Yet, there are big mistakes even here if the education is entrusted to one-sided ecologists and the mistakes reflect in the perception of environment by inhabitants.

Our study has shown that the nuclear power plant does not represent such a risk for the local populations and holiday-makers that could be expected from activities of various local and foreign initiatives. In the other hand, however, it has revealed a low weight of environmental problems in the system of values and an unclear awareness of environment and its scope.

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Reviewer

Prof. RNDr. Miroslav HAVRLANT, CSc.

ON THE LOW RATE OF UNEMPLOYMENT AND ITS CONSEQUENCES IN THE CZECH REPUBLIC

Petr CHALUPA

Abstract

The development of unemployment in the Czech Republic is completely different from that in the other countries of the former Eastern bloc. It also differs from trends in the highly developed West European economies; their transition to the post-industrial society is accompanied by rather high rates of unemployment. The atypical features of the Czech labour market are reflected in the present state of the national economy.

Shrnutí

O nízké míře nezaměstnanosti a jejích důsledcích v České republice.

Vývoj nezaměstnanosti v České republice je zcela odlišný od vývoje nezaměstnanosti v ostatních zemích bývalého východního bloku. Je rovněž rozdílný od trendů velmi vyspělých západoevropských ekonomik, jejichž přechod do postindustriální společnosti je spojen s vyšší mírou nezaměstnanosti. Netypické jevy českého trhu práce se odrážejí v současném stavu národního hospodářství.

Key words: unemployment, economics background, consequences, Czech republic

1. Unemployment: a problem of the 1990's

The predictions made by the International Labour Organisation (ILO) for the development of unemployment between 1990 and 1995 have not proved applicable in the Czech Republic. In the 1980's, the rate of unemployment in the EU countries was approximately 10%. In the early 1990's, it increased to 11%, peaking in 1994. After the first six months of 1995, the unemployment rate averaged at 10.6%. At that time, the smallest proportion of people without any job lived in Luxembourg (3.8%) and the Netherlands (6.7%). The highest rates of unemployment were reached in Spain (22.2%) and Finland (17.1%). Consideration of demographic development indicates that the unemployment rate can reasonably be expected to decrease to 7.5% by the year 2000 if the yearly rate of economic growth in the European Union is 3-3.5%.

At the Third Conference of the European Commission, which was organised as part of the „Week of Employment" at the European Parliament in Brussels in early November 1995, unemployment was discussed as the main economic problem in Europe.

In comparison with the unemployment rates of 10-15% in Poland, Slovenia, Slovakia and Hungary in 1990-1995, the average rate of unemployment in the Czech Republic is low (less than 4%). The Czech trend is completely different from trends typical of other East European countries of similar economic potential and political background. The low rate of unemployment in the Czech Republic was pointed out at a UN conference of more than 120 prime ministers and government representatives held in Copenhagen in March 1995.

2. Economic background

The creation of new qualities has always combined with transforming the cultural heritage and economic development of the past. In countries with a long history, new activity cannot start „from nothing". It must deal with artefacts produced by previous generations. The creation of a new wholeness thus entails not only heading for the innovative but also returning to the historica roots of existence, to traditions and to realizing the continuity of economic development.

The necessity for economic reform in Czechoslovakia was evident from the mid 1980's when it became apparent that the country was lagging behind in the building of its manufacturing infrastructure, protection of environment and, above all, developing of a creative capacity in its population. The roots of a deformation which originated over a number of years are found as early as the foundation of the Czechoslovak Republic in 1918. The new republic inherited from the former monarchy both the most of its industrial potential and its rather extensive market. As much as 70% of the economic potential of the Austro-Hungarian Empire was concentrated in Bohemia, Moravia and Silesia with only 26% of the monarchy's population. Post-war financial operations prevented inflation, but it was not until 1924 that GDP (Gross Domestic Product) reached the level of 1914. The crisis in the latter half of the 1920's and in the early 1930's in particular resulted in GDP going

down to the level of 1928 in the late 1930's. In general economic terms, the 1930's saw Czechoslovakia falling from rank 11 to 13 in Europe and from rank 15 to 18 in the world.

The 1948-1989 development was affected by two major factors present at its very beginning in 1948, after the first period of removing damages caused by World War II had come to an end: economic models were transplanted from the Soviet Union and no consideration was shown for an economic situation based on different geographic conditions, historical development, democratic traditions and conditions socially and culturally different from those in the other countries of the Eastern bloc.

Between 1949 and 1989, the physical volume of the national income increased 6.5 times (the 1985 GDP per capita was 63% of the US GDP and 76% of the Austrian GDP).

In this period the metallurgical, engineering and power and fuel industries expanded in disproportion with other branches of the national economy. A serious deformation was caused by the armaments industry, especially in the Slovak Republic. The volume of industrial production grew 13.6 times, accounting for more than 85% of all exports. However, this growth was largely due to supporting mainly conventional industries with high requirements for power and materials (only a small part of production was based on innovation and quality). The environment suffered extensive damage, not only as a result of a lack of ecological principles in industry but also because of ruthless methods and techniques used in agriculture: careless cutting down of scattered vegetation, elimination of erosion control balks, waterway straightening, excessive use of industrial fertilizers, etc. Agricultural production increased by 70% by the mid 1980's (compared to the level of 1961-1965). In the 1961-1989 period fewer people working in agriculture together with labour-saving developments in technology and materials resulted in labour productivity increasing 4 times. Flats built between 1948 and 1989 account for about 60% of the present housing capacity.

After 1989, the level of subsidy to agriculture was reduced (8% of agricultural production). The reduction was nearly 5 times higher than that in the EU countries (48% of the EU budget is spent on supporting West European farmers; 77% of agricultural production is subsidized from the state budget in Switzerland, 70% in Japan, 76% in Norway, 56% in Austria, 23% in the United States). Unlike the Czech Republic, most of the countries listed above subsidize the agricultural sector in order to prevent population migration from rural areas and maintain ecological balance in areas outside industrial centres and large cities.

In the first half of the 1980's, the average consumption of industrial fertilizers was 260-270 kg/ha. Not only from the environmental standpoint was this amount rather excessive. In 1991 consumption was 86 kg/ha (it has not been statistically recorded since) but it was estimated at only 50 kg/ha in 1993. Considering that less manure was available for fertilizing due to less livestock, this was also unfavourable.

Differentiation in wage tariffs is primarily a sign of the economic and social maturity of a country and the efficiency of its economy. In 1993, the minimum (state-controlled) wage in the Czech Republic was 2.200 CZK for 42.5 hours worked (40 922 CZK in Denmark; 35 532 CZK in Sweden; 32 270 CZK in Germany; 29 574 CZK in Luxembourg; 10 851 CZK in Greece; 9 574 CZK in Italy; 6 808 CZK in Portugal).

A large share of expenditure on foodstuffs in total expenditure indicates the economic efficiency of a country to some extent. The 1993 share of this expenditure in the Czech Republic was close to 33% among the working population and 45% among the retired (37.9% among the working population in Greece, 37.1% in Portugal). In the 1990-1993 period, prices in general grew by approx. 180%. The price liberalization of 1991 led to an increase of 159% in the prices of foodstuffs (compared to the prices of 1989). Butter consumption fell from 9.4 kg per capita in 1989 to its present value of 5.3 kg per capita. Beef consumption was 30 kg per capita in 1989 and 18 kg per capita in 1993. The consumption of milk and dairy produce in 1989 was 260 kg per capita and 182 kg per capita in 1993. More money spent on necessary foodstuffs and rising housing costs (electric power, gas, heat, water, housing services) reduced the physical volume of sales in non-foodstuffs.

Between 1992 and 1993 (in the course of economic transformation), the production of goods went down in all industries. A fall of more than 10% was seen in the mining, textile and clothing industries, the production of wooden goods, the production and processing of stoneware and particularly the production of machinery and devices. Producers do not make products which do not sell.

In the late 1980's the engineering industry (electrical engineering and means of transport not included) accounted for 20% of total industrial production (the percentage in Austria, Belgium and Sweden was 9%). The GDP share of all industries was still high in 1991: 61% (32.7% in the EU, 29.2% in the United States). By 1993 it had dropped to 46.3%.

A research project carried out by the staff of the Geography Dept. of the Faculty of Education of Brno Masaryk University deals with the development of labour potential up to the year 2000. Surplus labour was revealed in all districts, ranging from 3% (Prague, Brno) to between 7% and 12%. Up to 1991 controlled employment, the soft CMEA market, a large number of connecting links in management and enforced stockpiling made full employment among the working population possible (despite the relatively high percentage of surplus labour)

and helped to eliminate the adverse impact of the great discrepancy between the jobs and employment in general and the effect of fluctuations in the growth of labour.

As the intensity of labour migration is still relatively low and there is no real market for flats, unemployment rate indicators in the districts are not exact. Consequently, neither problematic regions nor the influence of the converted production base can be determined exactly. Even in state-supported agricultural problem areas (such as Louny, Znojmo and Bruntál) the situation is different from that in industrial districts such as Ostrava, Karviná and Nový Jičín.

Although updated data on labour (provided by the Ministry of Labour and Social Affairs) have been used since April 1994, it is still rather difficult and potentially ineffective to specify a certain rate of unemployment as suitable for being subsidized by the state without a complex analysis of social and economic conditions and a knowledge of the differentiated regional development policy.

3. Development of unemployment in the Czech Republic

The first wave of unemployment originated from changing the article of the Constitution which provided for the leading role of the Communist Party of Czechoslovakia in the early 1990's.

This was the frictional unemployment. Reducing the number of organizational segments and controlling institutions gave rise to the second unemployment wave which included people with university qualifications. The economic decline of companies whose solvency decreased mainly as a result of the loss of East European markets and the subsequent third wave of unemployment made people with secondary or vocational qualifications unemployed. This was the structural unemployment. The third wave was stronger in areas in which the conversion of the armaments industry was taking place.

The transition to market economy and the completion of economic transformation should bring another (the strongest) wave of unemployment in connection with the deferred bankruptcies of companies which will not be able to cope with economic pressure from abroad; unemployment indicators have not yet signalled this, however. Only after this stage is over unemployment in the Czech Republic will develop in accordance with the development of European unemployment model, of a cyclical nature.

In a period of time which is now difficult to estimate, there should also be the fifth unemployment wave due to the still remote boom of an established and well-functioning market economy.

There were 3 500 unemployed in the Czech Republic in March 1990. In December 1991, this number reached 221 600, and the unemployment rate was 4.1% (dropping to 2.6% before the end of 1992). The number of the jobless and the rate of unemployment at the end of 1993 were 185 200 and 3.5 %, respectively. From 1990, when the employment offices began operating, up to the end of 1994, 1.7 million people were registered. Regardless of changes resulting from new methods of processing statistical data and new criteria adopted by people looking for a job, 166 400 job applicants were registered in December 1994. The 1994 unemployment rate of 3.2% did not rise throughout 1995. The growing balance between supply and demand in the labour market was reflected not only in the extremely low unemployment rate (about 3%) but also in the number of vacant jobs, which was ranging between 50 000-80 000 (some 80% being manual jobs). On average, there were 1.6 applicants for each vacant job.

In the course of 1996, unemployment has grown in all districts except the new district of Jeseník in northern Moravia.

In terms of regional distribution, the rate of unemployment has traditionally been high in north-western Bohemia, northern Moravia and southern Moravia (border districts) and lowest in south-western and southern Bohemia (German and Austrian borders), central Moravia, a small area round Prague and spa areas of western Bohemia. The balance between supply and demand in the labour market is reflected in districts where the number of vacant jobs exceeds the number of applicants. There are 27 of these districts (including Prague) in the Czech Republic at present. On the other hand, there are districts where the number of vacant jobs is exceeded by the number of applicants by more than 2 000. These are the districts of Děčín, Chomutov, Louny, Most, Teplice, Třebíč, Bruntál, Frýdek-Místek, Karviná, Nový Jičín, Olomouc, Ostrava and Přerov. In the remaining districts the number of vacant jobs is exceeded by the number of applicants by more than 1 000.

4. Characteristics and consequences

The unique development of the Czech labour market gives rise to contradictory assessments and differing opinions. The following general conclusions may be reached:

1. If the unemployment rate is low and GDP decreases and becomes stagnant, overemployment derived from the period of extensive economic development is difficult to remove and the process of restructuring the economic base is slow. An intensive tendency towards the growth of GDP and industrial production during 1995 was partly devalued by the approximate moving rate of inflation of 9.7% (the growth of inflation was higher than the growth of industrial production by nearly 1.9%). A decline in the national

economy and a slow reduction in the number of employed people also saw the level of productivity go down. Between 1989 and 1993, the GDP per person employed fell by 12%, thus widening the gap between the Czech Republic and other advanced countries. Hourly productivity is now lagging behind even further as a result of longer working hours (only some 36% of the hourly productivity in Austria). The declining production and productivity affected large businesses (25 or more staff) in particular. In 1993, as many as 31% of the total number of people working in the economy was employed by private firms. However, this boom for the private sector was not enough to balance the difficulties in the remaining sectors, where most of the country's production (88%) is concentrated. During the 1990-1994 period, GDP dropped by 20%, industrial the production by 39% and agricultural production by 27%.

The coupon privatisation has resulted in the division of what was formerly owned by the state among nearly 6 million private owners (80% of the adult population) and the concentration of the rights of disposal owned by minor shareholders (only 14 funds owned approx. 75% of all the shares held by funds after the first wave of coupon privatisation; similar to the situation after the second wave). This can make businesses, investment funds and companies behave in a way which prevents the millions of scattered primary shareholders from having any influence over their actions.

2. The emerging private sector seems to be able to absorb free labour in the growing third sector (services), especially in banking, the insurance industry, state administration and commerce. A comparison of the development of employment and changes in the structure of employment gives percentages comparable to the results achieved in this sector in highly developed West European countries. However, the number of people working in the fourth sector (research and development) is small; it has dropped by almost 72% since 1989, when about 138 000 people were employed in research and development (only 39 000 in 1994). Among the OECD countries, the Czech Republic ranks last in the per capita expenditure on research and development (USD 631 in the United States, USD 579 in Japan, USD 279 in Austria, USD 36 in Greece, USD 28 in the Czech Republic). The country's position in expenditure on basic research is similar. The funds spent on research and development account for 4.45% of GDP. In 1994, only 25% of the finance spent on research and development in 1989 were spent in the same field (inflation considered).
3. The present development of unemployment shows a tendency to preserve social stability at the cost of slow economic restructuring. In the developed economies, the transition to post-industrial society was accompanied by unemployment rates more than three times as high as the rate of unemployment in the Czech Republic at present.
4. The situation described is likely to become more complicated in the light of demographics: the population of the Czech Republic has been on the decrease since the mid 1990's. The number of people at retirement age (by present criteria) is expected to rise from 2.1 million to 2.2 million at the turn of the 21st century as a result of the diminishing birth rate (2.4-2.7 million in 2010, 2.5-3 million in 2020). The number of children (0-14 years) will decrease from today's 19.4% to less than 15%.
5. In the Czech sector of services, in addition to a sudden increase in employment, technology exists which is capable of providing cheap high-standard services requiring no excessive investments of time and labour. The third sector in the developed post-industrial society is marked by the reduced demand for labour and higher requirements for the education and qualification of employees. This is not happening in the Czech Republic.

The present state of affairs in the development of unemployment is not a mirage. It is a fact based on existing economic reality. The developments of 1996 and the years to follow will show whether the trends and tendencies of 1994 and 1995 towards an extremely low unemployment rate (in European terms) are of a lasting nature and whether only some 61% of the unemployed will rely on employment offices as of is the case today. It will be very interesting to observe the consequences of this rather atypical development. The correct setting of trajectories for the future development of a society is one of the major features of this society's economic and social life. However, for the labour and employment sector, it is a matter of crucial importance.

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Reviewer

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SALZBURG CONGRESS ON URBAN PLANNING AND DEVELOPMENT

Antonín VAISHAR

Salzburg Congress on Urban Planning and Development (SCUPAD) is an independent non-profit organization with its statues lodged with the City of Salzburg. It originates from the Salzburg Seminar and was founded by the fellows of the Seminar's Planning Session in 1965.

The SCUPAD objectives are as follows:

- to continue contacts among participants of all Urban Planning and related Sessions of the Salzburg Seminar,
- *to exchange research results and new concepts and policies in the field of urban planning and development,*
- *to organize an annual congress on urban planning and development, and to publish its results in the SCUPAD Newsletters and other publications.*

The 150 SCUPAD members are based all over Europe, in the Middle East and North America, and lately also in other countries. Professions represented in SCUPAD include architects, city and regional planners, ecologists, economists, geographers, lawyers, sociologists as well as politicians.

With its annual congresses, SCUPAD attempts at raising topics for discussion concerning contemporary nature, which are of critical relevance to urban planning and development. SCUPAD has developed its characteristic style as a more personal exchange among experts, so as to engender:

- informality, facilitating personal input rather than officially approved statements,
- *international and transdisciplinary discourse,*
- *a lively social and professional network that carries on beyond the Congress.*

The already 28thSCUPAD Congress was held at the beginning of June 1996 under the slogan REGIONS ON THE RISE and it was attended by 44 experts from 17 countries of Europe, North America and Near East. The most represented countries were Germany, Netherland, U.S.A., Israel and Italy.

Form of the Congress usually derives from its mother institution - the Salzburg Seminar. Key papers were mainly presented at the beginning of the event being followed by plenary discussions, targeted discussions within Seminar groups whose conclusions were made public at plenary meetings again. Then there was another round of discussions in the Seminar groups, which concerned issues aroused from the first discussion round. The whole event ended with a final plenary discussion. This arrangement gave a possibility to each participant to take part in the discussions. In addition, a considerable number of participants took an active part in the formulation of inquiries and answers as speakers, leaders of seminar groups, seminar group reporters, etc. Results from the Congress will be published in SCUPAD Newsletter.

The opening paper concerning Regional Planning and Development: The European Perspective was presented by Leo van der MEER (Arnhem, Netherlands). It tackled political frameworks of the regional issue a.o. also on the basis of principal documents of EUROPE 2000 from 1991 and EUROPE 2000+ from 1994. It appears that the major (unpronounced) reason to the increased concern of European Union for the regional issue is an effort to put a brake on the influence of powerful national countries such as Germany and France by dissecting them into regions which would be capable of mutual competition. The so called Euroregions between the EU countries and on the EU borders with

other European countries are expected to reduce marginality of these areas and - similarly as in the former case - to weaken the influence of national countries. An example can be seen in the present Swiss borders which have been compactly covered with a system of Euroregions that are gradually incorporated into the EU mechanism, so that it is only the very central part of the country which has been left outside the Union. The national states obviously begin to be perceived as an objective brake to the process of aggressive European Union integration by its advocates. They even become to considered politically obsolete - an anachronism which may be a nursery of Nazi ideologies as well as political and economic discrepancies. Although the whole process of regionalization in Europe is being declared a decentralization, it is necessary to answer the question whether the disintegration of Europe into the regions would not - on the other hand - increase the importance of Brussels as a EU center. It is also worth mentioning that in terms of the European Union the Czech Republic could have a maximum of two regions: Bohemia and Moravia. A more detailed differentiation would be simply not possible to cope with from the Center (Brussels).

The author demonstrated his scheme of development in Europe by means of a model called „Red Octopus". The development belts stretching from the central European areas (Benelux-Rhineland/The Ruhr Basin-North Italy) to the East of Europe pass the Danubian Basin in the Vienna-Budapest-Beograd direction and the Polish plains in the Berlin-Warsaw-East Europe direction. The Czech space is outside this planned development belt, and neither Prague nor any other Czech city is included in the planned innovation centers - in contrast to Budapest, Warsaw, Beograd, Poznan, etc. The project was criticized by some participants as excessively identifying development with the major axes of technical infrastructure. Some opinions anticipate rather a development based on certain innovation poles, ie. important cities or agglomerations.

Contrasting aspects of regional experience were presented by Neal PIERCE (Washington, U.S.A.) who discussed urban regions, Peter TOWNROE (Sheffield) with comments on the restructuring of one of the largest metallurgy centers of the last 20 years, and Rajmond REHNICER (Sarajevo-Prague) who dealt with the problem of regional identity. Following were the concrete regional projects presented by Christian HAE-

Fig. 1 Leopoldskron Castle: seat of the Salzburg Seminar - provides august environs for efficient course of SCUPAD congresses. The Castle is known as a scene of one of the most successful super movies of all times „Sound of Music"

Fig. 2 The town of Salzburg is the fourth largest city in Austria. It is known as a cultural center associated with the name of W. A. MOZART and an important tourist center.

FLIGER (Basel, Euroregion Upper Rhineland), Dieter KEIM (Cottbus, Euroregion Frankfurt/Oder-Slubitz) and Anat GONEN (Haifa, Rural regions in Israel).

From the viewpoint of a geographer, the discussion was somewhat confused at the beginning with unnecessarily too much time being spent by attempts at a general definition of the region. It was apparently much more important to cast light on the objectives of concrete regionalization planned by the European Union, to clear the task of regional planning at implementation of these objectives, and to search the most appropriate methods. It must be said that regional planning has been recently going through a certain crisis even in West Europe, which was caused by changed conditions. Instead of making the projects to order (mostly for governments) a delicate game is opened between various actors in regions (politicians, businessmen, scientists, non-governmental institutions, citizens). It is possible to claim that the 28th SCUPAD Congress provided its participants with certain intellectual impulses in this process.

A part of the Congress was also the General Meeting of members. The forum was presented reports by the Secretary on membership issues and by the cashier on budgeting. In this connection an important fact is that SCUPAD is financed almost exclusively from membership dues (raised to 500 ATS per year) and conference fees. A new Committee was elected as follows: Chairman - Ron SHIFFMAN (New York), Vicechairmen - Leo van der MEER (Arnhem) and Frohmut GERHEUSER (Brugge), Secretary - Dick van ALPEN (Haag), Cashier - Gerhard SCHIMAK (Vienna), and members Angelika ARRAS (Basel), Elly BOOMSMA (Amsterdam), Enrique CALDERÓN (Madrid), Adam MAZOR (Haifa), Joachim SIEFERT (Düsseldorf), Bruno ZANON (Trento), Peter ZLONICKY (Dortmund). One seat has been left vacant for a possible member from East Europe. A basic problem much discussed at the meeting is the fact that experts from our part of the world find it impossible to travel - in some cases even several times a year - to the Committee workshops held in West Europe.

A topic of the 29th SCUPAD Congress will be „Planning and the Creativity". The Congress will again be held in Salzburg from 30 May to 2 June 1997, and will be a part of the festival organized to the 50th anniversary of the Salzburg Seminar. Possible topics were discussed for further meetings of which the meeting in 1998 will be the thirtieth.

The 28th International Geographical Congress THE HAGUE 1996

Antonín VAISHAR

The 28th International Geographical Congress was organized by Royal Dutch Geographical Society. The Congress was held in the Dutch Congress Palace in Hague, 4-10 August, 1996.

The main organizer was the Faculty of Geography, University of Utrecht jointly with other high schools and government institutions. Motto of the Congress was „Land, Sea and Human Effort".

According to the list of participants, which was prepared before the Congress, there were 1354 persons present. However, the final figure might have been considerably different, and the organizers spoke of some 1600 participants. Over 50% of the registered (773) were from Europe. Of these, 615 and 158 from economically advanced and post-Communist countries, respectively. The continents of Asia, North America, Australia with Oceania, Africa and Latin America were represented by 223, 146, 74, 71 and 47 geographers, respectively. The most numerous delegation was from the Netherlands (129 persons), U.S.A. (114) and Great Britain (112). Strongly manned delegations were also those of France and Germany (each counting 71 participants), Australia (56), Japan (55), Sweden (44), Russia (42), South Africa (40), Italy, Spain, India, China, Canada and South Korea. The long list should demonstrate the strength of global geographical powers from the European point of view. The Czech Republic had 10 geographers at the Congress. As to our closest neighbours, there were 19 representatives from Poland, 10 Hungarians, 4 Slovaks, 11 Slovenian geographers and 7 Austrians.

In terms of its extent, the main contents of the Congress consisted in technical sessions which were organized by individual committees and IGU study groups. In addition, there were workshops organized in thirteen technical sections that reflected topical problems of contemporary geography. In total, there were 48 symposia of which the majority were held for more than a day. In the top of it, there were 10 plenary meetings to follow the conference motto, 33 papers characterizing the situation in individual geographical disciplines. The programme included 1260 technical papers in total length of 415 hours, presented were 219 posters, and there were also a whole range of technical discussions. Abstracts of the individual presentations were published. Publication of full papers is a business of each symposium organizer. The technical workshops were supplemented with numerous excursions, exhibitions and films. The mentioned structure formed a very colourful and complicated mosaic within the scope of which more than 20 events were held at the same time in many a case. The Dutch Congress Center offers good facilities for organizing such a number of events in one building with a sufficient social background. An exception was the Committee on Geographical Education whose workshops were held elsewhere. Concentration of the majority of events in one place made it possible for all participants to focus precisely the issues they were concerned with. However, another side of the coin was the fact that the Congress participants were scattered in different workshops with their attention being invaded by too many interesting activities.

There was a great number of inspirative new technical ideas and much experience exchanged. However, this is not the major reason for organizing events like these. What is most important are contacts between experts. The human contact is irreplaceable even in the era of faxes and internet. Congresses of the Hague type are mainly the congresses of contacts, information, offers of literature, publicity of workplaces, announcement of international conferences and the like. The main assembly of participants come regularly to visit the events, considering them to be socially significant. Other participants have a rare possibility to exceptionally visit these international congresses, or they have a

concrete target there. Important part of the Congress was sales of scientific literature ensured by both renowned publishing houses such as ELSEVIERS or KLUWER and by individual national delegations of which most active were those of Germany and France. The result was an even more colourful mosaic of interests than in the case of current technical activities. Well, this is reality of the scientific life.

A pleasant change at the 28th Congress was International geographical contest of secondary students under the auspices of the Committee on Geographical Education. The contest of 3-member teams consisted of three laps: terrain research, technical essay, and a quiz of geographical knowledge. The teams came from Belgium, Germany, Netherlands, Poland and Slovenia and the winning team was that of Poland. The event is considered very important by the IGU executives who appointed the organizing committee of the 29th Congress to repeat the contest. Another social event was a commemorative celebration of the 125th anniversary of the first geographical congress that was held in Antwerp in 1871.

Another important result of the 28th Congress was the election of a new IGU Chairman. Resigning Herman Th. VERSTAPPEN from Belgium will be replaced by Bruno MESSERLI from Switzerland. The new Chairman presented his inauguration speach in which he pointed out the main objectives of IGU in the coming period such as integration with global programmes such as Global Change, Habitat or Agenda 21. It is considered important for the future that the role of scientists from developing countries is strengthened since it is there where the majority of contemporary global problems concentrate and where less than 10% total number of world experts work on their solution. Great attention is going to be paid to geographical education. In addition to the IGU meetings, there were also workshops of nine committees and IGU study groups.

The resigning Chairman awarded IGU prizes to outstanding world geographers : Yole VERHASSELT (Belgium), Harold C. BROOKFIELD (Australia), and Huang Bin WEJ (China). New medals for political contribution to the problems of environment protection were awarded to Ms. Gro Haarlem BRUNTLAND and Mr. Al GORE. The medals were taken over by chairmen of IGU committees from Norway and U.S.A. At the end of the event, the flag of International Geographical Congress (which was granted by organizers of the 27th Congress in Washington) was handed over to organizers of the 29th Congress.

There are many geographers who lately ask a question whether there is any sense in organizing these international geographical congresses which are rather demanding both in terms of their organization and finance. It apparently depends on what the individual participants expect from these events. However, it is for sure that any inflation of them should be prevented. A 4-year interval with some regional conferences in between appears to be optimal as well as a discriminating choice of organizers. The next 29th Congress will be held under the motto „Living in Diversity" in Seul, 13-18 August 2000. Prior to this date, there will be a regional conference on the theme „The Atlantic: Past, Present and Future" in Lisbon from 30 August-2 September, 1998. Candidate for organization of the 30th Congress in 2004 is the Royal Scottish Geographical Society which is going to hold it with the central theme „Geography and Communication" in the congress center in Glasgow.

THE REGISTRATION OF AREAS OF SUSPECTED CONTAMINATION REGARDING DUMPS IN THE BRNO CONURBATION

Wolfgang FISCHER - Pavlína HLAVINKOVÁ

1. Introduction

With regard to efforts of the Czech Republic to become a member of the European Community, attention must be paid not only to economic restructuring but also to ecologically political aspects such as environment protection. In the EC countries, and namely in Austria and Germany, the environmental protection plays a very important role thanks to Green groupings at the beginning and Green parties later on.

Besides the environment-friendly production of industrial plants, noise and exhaust-reduced traffic to mention but a few, there is also a question of sins regarding the environment that were committed years ago, which becomes ever more topical. Especially former waste deposits are in the first place of importance.

Since December 1993, a teamwork between the Institute of Geonics in Brno and the Department for Applied Geography at the Institute of Geography, Karl-Franzens-University in Graz has been running tests in a certain experimental area on the methodology of inquiry and the following valuation of former waste deposits in the municipal area of Brno. All these legal or illegal dumps are - with no exception - a potential jeopardy to environment. In the future, necessary steps have to taken for protection and rehabilitation. In the course of the work, these working methods which have already been applied in Germany and Austria are tested for their applicability in the Czech Republic.

Objectives of the first stage of the project shown in this paper consist in a complete registration and localization of all previous waste deposits, creation of a statistic digital data basis (page number of the respective topographical map, numerical order of the area, description of the site, depth. length and width of the area, deposit form, geological situation, hydrogeological situation, change during the period of project implementation, topical use) to obtain a direct comparison of the locations and also the photographic documentation.

2. Area of the project

The area under study is of about 115 km^2 and it is situated in the SE direction of Brno (Fig. 1). In its NS expansion it extends from Maloměřice to Tuřany, its WE expansion then stretches from Vídeňská street to Šlapanice. This area was deliberately chosen because of its high possibility of finding a large concentration of dumps there. On the one hand, the geological subsoil consists mainly of Quaternary and Tertiary loose materials. In the other hand, it consists also of limestone. Sands, gravel and limestone are subjected to extensive mining in gravel-, sandpits and limestone quarries. These concave surfaces which came into existence through erosion or due to anthropogenic influence offer the best opportunity to be used as dumps. Not only waste management companies but also individuals use the possibility of depositing wastes consisting of rather varied waste products. After having been filled, the deposits are mostly covered with soil or debris so that later on, many of these locations may not be recognized as the former waste deposits.

When talking about danger to our environment consisting in waste deposits, we are also talking about jeopardy to groundwaters (odours - for instance - are considered to be rather a form of impairment to environment). In some parts of this area, the groundwater

is shallow, and a very fast pollution may occur in the case of a possible release of harmful pollutants.

3. Method of work

The working method is based on utilization of different sources of information as well as on the fieldwork. After gathering documentation such as aerial pictures or maps, which often can be differing in their quality, their interpretation is affected multitemporally. In other words, the aerial pictures and maps are a subject of comparison analysis which may take several decades.

3.1 Sources of information

The aerial pictures, maps and plans, files, studies, reports, test results, inquiries and inspections in the locations can be considered information sources (Huppert - Nieder, 1992).

3.1.1 Aerial pictures

Aerial pictures which a direct reproduction of reality offer high meaningfulness as regards to their content. As an indirect information method for maps of areas suspected of being polluted, the aerial pictures seem to be very good. But the aerial pictures describe a certain part just at the time when the photograph was taken from the air realistic in detail (temporal). For that reason, registration of the Brno conurbation should be made from several aerial picture time-series (multitemporal). For this method of multitemporal aerial picture interpretation, the aerial pictures made in 1953, 1969 and 1990 are available.

Besides the temporal components, physical distribution of disposal locations also plays a very important role. If it is possible, the spreading can be found out as very clear plots but it depends on the scale of aerial picture material. Concerning the aerial picture interpretation, the usual scales are from 1:5 000 to 1:25 000. For the project under study, aerial pictures on a scale of 1:25 000 can be obtained from the aerial picture station at the military institute of cartography in Dobruška. However, a really plot-sharp registration of topical and previous waste deposit locations in the project area in the course of stereoscopic utilization by the Institute in Graz can in some parts be very difficult because there is a quality difference among the individual aerial pictures. The desirable, original scale of 1:10 000 that is possible to get in Austria and Germany is just to get the phototechnical blow-up of the 1:25 000 aerial pictures. Therefore, no optimum result can be ex-

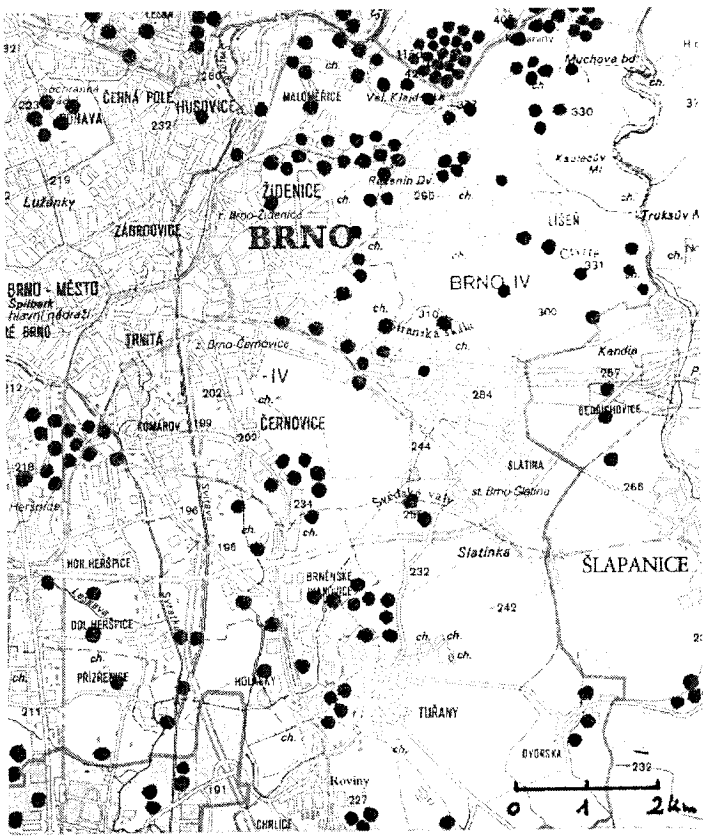

Fig. 1 Project area and spreading of suspected former waste deposits found

pected. For this reason, the maps are used as the sources of information in the course of this project from its early beginning.

3.1.2 Maps

In comparison to aerial pictures, maps have a disadvantage of being generalized as regards their contents and facts. In the project work, however, they are a supporting and important medium with their interpretation being in addition more reliable with the help of the legend than that of the aerial pictures. Very careful map reading is a matter of course, though. Topographic maps available on a scale of 1:10 000 are those from 1960, 1975 and 1991. The present municipal area is densely populated. For its mapping, there is a possibility of using historical maps of the town on a larger scale. Searching those maps of a different time-series, one is constantly confronted with a problem concerning availability. Our experience from the course of the project work indicated that many single map sheets are not available also due to personnel change in the Institute after the recentcal transformation.

Besides the elicitation of the physical spreading of locations during different periods with the help of topographic maps, thematic maps can also be very useful. They are used to assess danger wherever it concerns geological subsoil, natural geomorphological forms or hydrogeological relations. But these maps are mostly available on a scale of 1:50 000. For this reason, they often exhibit too much inexactness, especially in the individual locations situated on the limits of two geologically different types of rocks. In these cases, one has to return to the inspection of the site.

3.1.3 Other sources of information

In addition to the aerial pictures and maps, important are also maps, files, reports, studies and results of tests. Very detailed facts can be obtained by inquiring at offices and institutions. Willingness to cooperate is provided which of course is not given on the basis of the lack of interest in former waste deposits. One mostly comes across scepticism and it lacks information. In addition, no materials are available because there has never been made any study or report. That is so in the area of inquiry. An insight into the properly kept company files would be great but is nearly impossible.

All sources have to undergo a discussion in which following questions must be answered (Huppert - Nieder, 1992):

- *Is the use of all these sources possible also in practice?*
- *What sources are necessary at all for the first registration of previous waste deposits?*

A conscientiously multitemporal interpretation of topographical maps assisted with some aerial pictures is necessary for the project in the Brno conurbation for the first registration as well as an inspection of the site, which takes a lot of time - or in other words, the first stage of the project will necessarily take some 10 months.

3.1.4 Inspection of sites and inquiries

Both inspection to the sites and questioning are indispensable working steps in order to register the former waste deposits. Both are used for addition and verification of information sources mentioned above. In addition, recent changes concerning the usage can be discovered. Especially the question concerning the present use that cannot be found out of the topographical maps made in 1991 is of the greatest importance (Fischer-Zsilinesav, 1995) with regard to possible ongoing measures such as securing and rehabilitation. One is often faced with problems concerning accessibility of private property. Problems arise in deposition areas unclear in terms of their documentation. Hand-made sketches, photographs and written notes must be traced by questioning and site inspections.

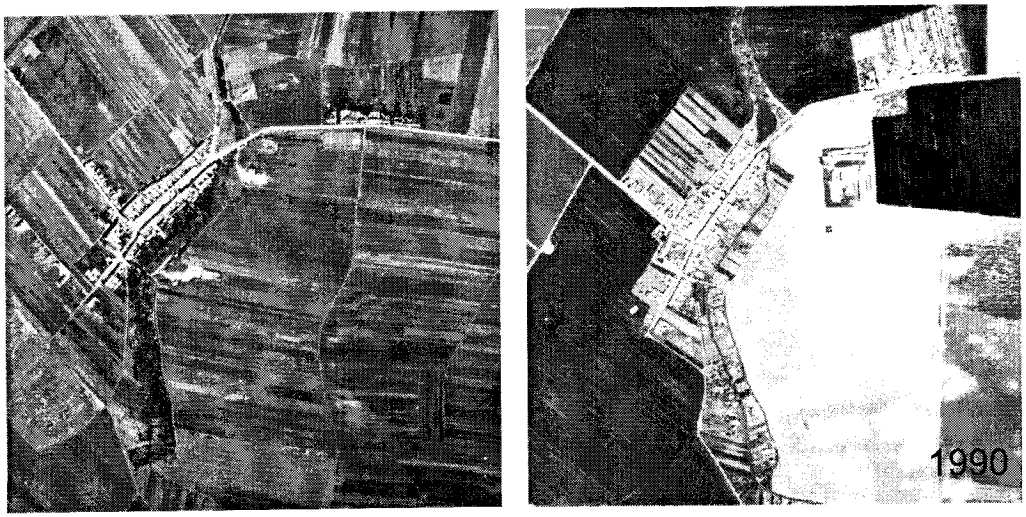

Fig. 2a Aerial photograph section of Dvorska village from 1953 (approx. 1:25 000) and from 1990 (1:26 200) with kind approval of VTOPÚ Dobruška and GŠ-AČR

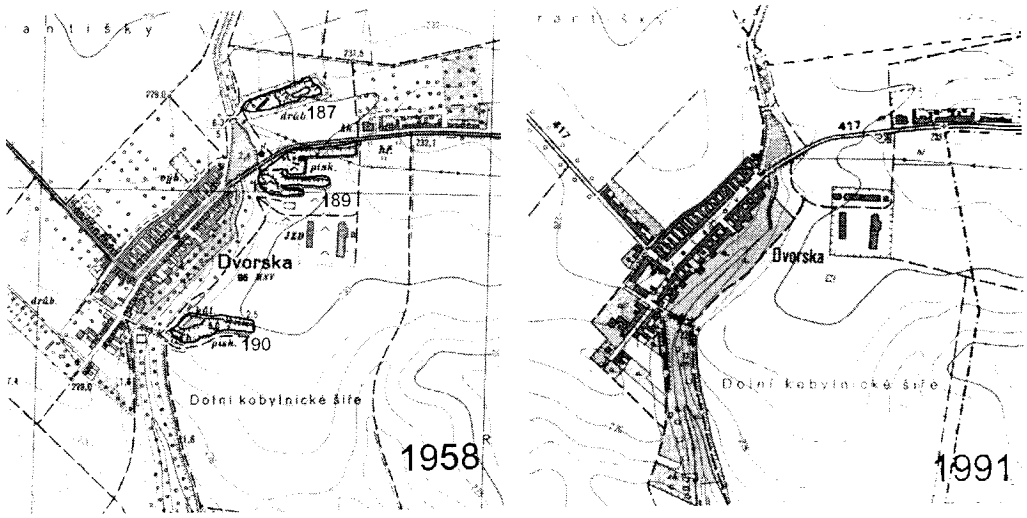

Fig. 2b A section from topographical maps 1:10 000 of 1958 (sheet No. M-33-106-C-b-2) and of 1991 (sheet No. 24-43-06)

4. An illustration example of the working method

From this illustrated example of Dvorska (about 8 km SE of the centre of Brno), the methodology of multitemporal comparison of aerial pictures made in 1953 and 1990 (Fig. 2a) and topographical maps made in 1958 and 1991 (Fig. 2b) is shown briefly. Both sandpits (písk.) (lfd No. 189, 190) and the used pit which is used as a poultry farm (drůb.) (lfd No. 187) are clearly recognizable on the aerial picture made in 1953. In comparison to the 1990 aerial pictures, the areas are submerged and totally le velled out. In the course of the inspection right on the spot, old prohibition signs were found of illegal disposition of the dump, which point out that the area is a former waste deposit. Size and depth of the pit can be seen on the map from 1958.

5. Summary

Problems may arise in analysing aerial pictures whose scale is too small. However, with the aid of snaps on a scale of 1:10 000, exact spreading relations can be found out. Site inspection will then clear up all other possible questions. Another problem occurs when evaluating thematic maps such as a map of hydrogeological relations, where the

too inexact reports would have to be made because of the scale 1:200 000. In this case, there is a demand for a sound data basis, in other words for a map with the larger scale.

A specific inquiry is in preparation for neighbours and for representatives of local authorities (preferably old citizens) with regard to the content and usage of deposits with the assistance of prepared questionnaires that are seen as the second stage of the project. With the help of these results, an evaluation of all pollution-suspected areas should be considered.

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The XVIIIth ISPRS CONGRESS: Meeting of experts in photogrammetry and remote sensing

Vítězslav NOVÁČEK

The XVIIIth ISPRS Congress (International Society for Photogrammetry and Remote Sensing) was held in Vienna in 9-19 July, 1996. The representative „Austria Center Vienna" which is situated in the close vicinity of UN buildings was chosen for the Congress workshops. The Congress itself was preceded by demonstration of technologies (tutorials) in 8-9 July, 1996.

The ceremonial opening of the Congress took place in the Ceremonial Hall of the Habsburg family winter residence - Hofburg, 9 July in the evening hours. The opening speach was presented by Mr. Karl KRAUSS - Director of the XVIIIth Congress and, at the same time Professor of the Technical University in Vienna. Ceremonial speaches of ISPRS representatives and important Congress guests took turns with music performances of the Johann Strauss orchestra and ballet of the Vienna National Opera. In the course of this ceremonial introduction, Professor F. ACKERMANN from Stuttgart was nominated an honorary member of the Society. The following pompous ceremonial reception that was held in representative halls of Hofburg was organized by the Austrian Society for Geodesy and Geoinformatics.

The next nearly two weeks were devoted to the presentation of technical papers and thematically oriented posters in four halls of the Congress Center and in adjacent spaces. The highest number of presentations that included papers, reports and posters was in committees 3 and 4, the lowest number of them was in committees 1 and 6. The „last-minute" registered posters could be presented in a so called „Hyde Park Corner". The most appealing ideas and hints from technical papers and reports reflected in Congress resolutions. General Assembly meetings were held in the afternoon hours, which decided a.o. on organizers of the next Congress. The afternoons were booked also for technical committee s and elections of new councilmen of the Society. Potential organizers of the XIXth Congress were Netherlands and Indonesia, in other words Dutch and Indonesian photogrammetrical societies. The Netherlands won by 140:52 votes. Director of the XIXth ISPRS Congress will be Prof. Jan Klaas BEEK, President of the ITC - International Institute for Aerospace Survey and Earth Sciences. The XIXth Congress will be held in Amsterdam, 16-22 July 2000. In addition to a whole range of new recommendations and ideas, the General Assembly selected a new Council whose members are as follows: **Lawrence W. FRITZ (U.S.A.) - President of ISPRS**, Shunji MURAI (Japan) - the first Vice-President, Marcio BARBOSA (Brazil) - the second Vice-President, John TRINDER (Australia) - Secretary General, Heinz RUETHER (South Africa) - Cashier, Jan Klaas BEEK (Netherlands) - Director of the XIXth Congress, Armin GRUEN (Switzerland) - Chairman of Financial Committee.

A technical exhibition with 97 participating companies, firms and institutions was opened on Monday, 15 July, 1996. Although the exhibition area rental was rather high, the exhibition hall was nearly full. Characteristic features of the exhibition can be described as follows:

- decline of the conventional photogrammetrical apparatus such as analytical plotters,
- digital photogrammetry has already passed the experimental stage having been verified in commercial applications,
- the stage of automation in orientation algorithms and DTM generation is high,

- easily available satellite photographs and new satellite commercial programmes will provide data whose resolution will be in meters,
- output equipment of high standard has recorded rapid commercial boom.

Beside the renowned firms such as Carl Zeiss, Intergraph, PCI, Erdas, ITC, Hansa Luftbild, GEOSPACE, ESRI, SPOT Image etc. there were also three representatives from the Czech Republic at the exhibition: Geodis Brno, s.r.o., Help Service Mapping Prague, and VÚGTK Zdiby. Their participation at the exhibition should be mentioned as respectable. The three companies have thus contributed to the good representation of the Czech Republic. The Brno office of the Institute of Geonics was represented in the group of posters with a sample sheet of Satellite Atlas of the Czech Republic. Methodology of the Satellite Atlas was published also in the Proceedings from the XVIIIth ISPRS Conference, Committee 4. The Congress was officially attended by 2528 participants of whom some 40 were from the Czech Republic. It is worth mentioning that there were several significant prizes awarded during the Congress, and it was for the first time in the history of ISPRS that a so called Doležal Award was granted that is sponsored by the Austrian Society. This prize was awarded to 30 participants from developing and reforming countries for the development of photogrammetry and remote sensing. One of the awarded was Ing. Karel SUKUP, Managing Director of Geodis Brno, s.r.o. The Congress included a colourful social programme - concerts, receptions, a visit to an exhibition, a castle party, a bike trip etc. These accompanying events make it possible for the Congress participants to drift away from technical and scientific issue for a while and to establish new friendly contacts with their colleagues.

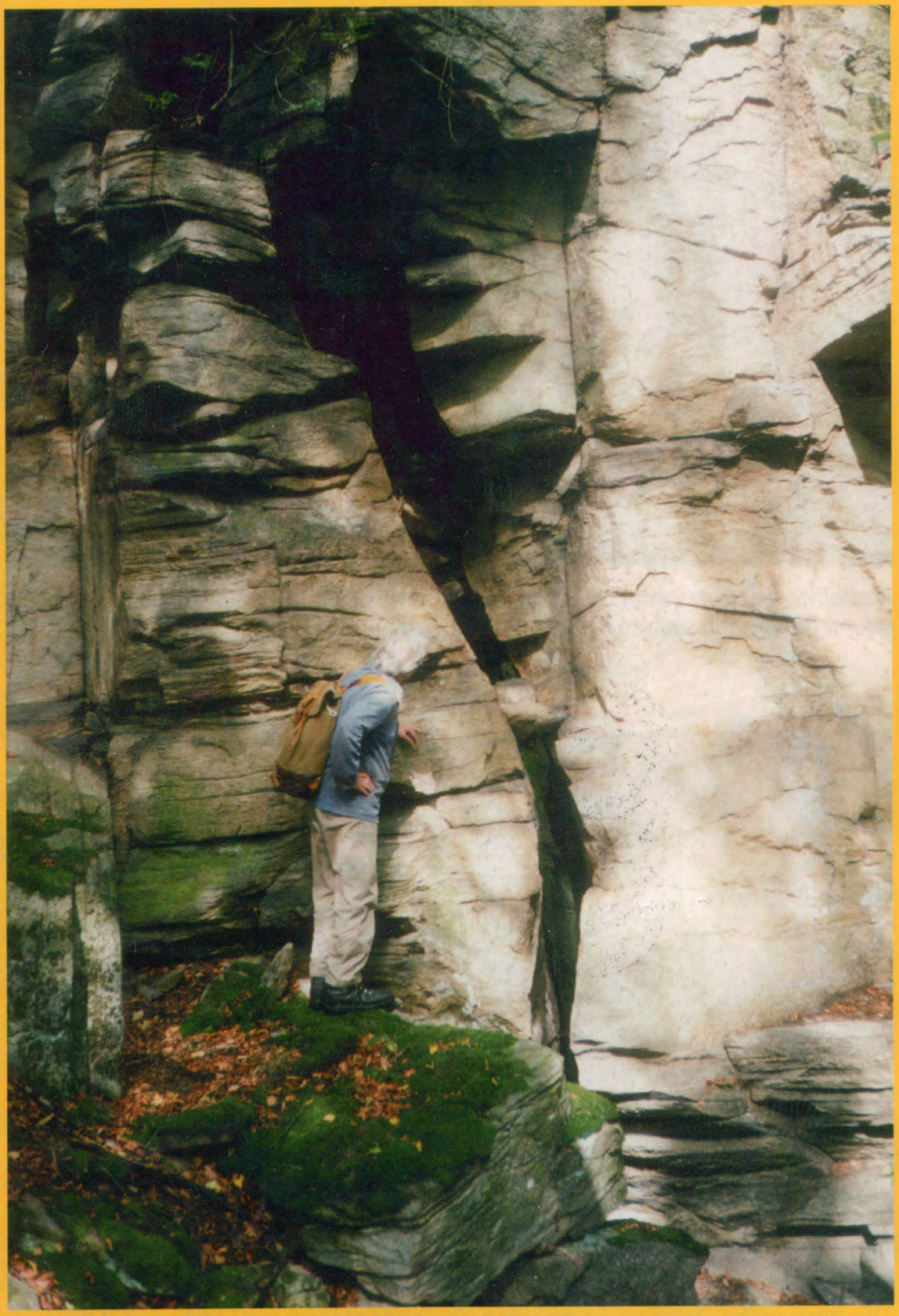
44 Congress resolutions state the present situation in photogrammetry and remote sensing and bring recommendations for future development of this scientific branch in next four years. It was stated that the participation of our country is generally valued as positive and that our representatives from the scientific branches of photogrammetry and remote sensing keep pace with global progress.

Czech participants of the 18th ISPRS Congress in Vienna

Mohelno: the lower water reservoir for the pump power plant Dalešice - a part of the power generation system Dukovany-Dalešice.

The bank of the Dalešice water reservoir - near at Hartvíkovice camp: 8 km from the nuclear power plant

Illustrations to the paper of H. Horská et al.; photos: Mojmír HRÁDEK



Opening of rock fissures due to deep-seated creep of gneiss of Bíteš on the left valley side of the River Dyje

Photo: Jaromír DEMEK