SCRIPTA FAC. SCI. NAT. UNIV. PURK. BRUN.
Vol. 13 (1983), No. 10 (Geographia), p. 401—408

LANDSCAPE RESEARCH OF THE ROSICE—OSLAVANY AREA
(mid-west Moravia, Czechoslovakia)

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Received for publication: June 1982

SUMMARY

The landscape case study of the Rosice—Oslavany area (190 km², 38 000 inhabitants) by a team of geographers from Geography Department, Faculty of Science, J. E. Purkyně University of Brno, Czechoslovakia, based on integrated landscape survey was done in 1976—1980.

Landscape components as landforms, topoclimate, surface and ground water, soils cover, phytocenoses, land use and man-land interactions were analysed. Synergetic and synchoric links among landscape components and segments were investigated for understanding the landscape processes, genesis, evolution and dynamics.

Elementary homogeneous and heterogeneous landscape spatial units were indentificated there. The latter denoted as "topochores" were studied after their scalar, gradient, vector and mosaic structure. They are basic operational units for the landscape management. Data base for storing and processing their attributes is relevant in decision-making, adjustment of man-land interactions.

Landscape of the Rosice—Oslavany area is a part of three mesochores: The Bohemia—Moravian Highland, the Brno Highland and the Boskovice Furrow. They are divided into 13 microchores. Land use since the quarter of 19th century and man-land interactions were surveyed there, too. Successful and unsuccessful interactions were recognized and recomendations for improving landscape management were offered.

INTRODUCTION

In 1976 a team of geographers from the Geography Department, Faculty of Science, J. E. Purkyně University in Brno, Czechoslovakia started a landscape survey in the Rosice-Oslavany area, not far from Brno town. Land under survey has 190 km² and 38 000 inhabitants. Landscape survey techniques were accepted the ideas of former research done by A. Hynek and P. Trnka (1981), with innovation offered by A. Hynek (1981).

Landscape of the Rosice-Oslavany area was portrayed by integrated survey of geomorphologists, climatologists, hydrologists, pedo-, bio- and land use specialists. A principal conception of integrated landscape research was prepared by A. Hynek, respecting J. Drdoš (1972) who was the first in Czechoslovakia formulating integrated landscape research. Our conception is more advanced: integrated landscape research is intended for connection of management and information systems on landscape and includes:

— the analysis of landscape components
— the synthesis of synergetic relations, their functional integration produced

and producing the processes of matter and energy flows with certain structure, form in evolution and dynamics development identified in elementary homogeneous landscape units as spatial units with their attributes
— the analysis and synthesis of synchoric links among elementary homogeneous landscape units grouped in elementary synchoric ones on topo-choric level
— man-land interaction within the landscape acting upon natural processes causing the responses of man's impact
— suitability, evalution, landscape potential for certain human activities with respect to maintenance of natural processes and preventing landscape decay, degradation
— the synthesis of social goals, tasks, objectives in landscape management and natural invariant maintenance for adjustment of man-land interaction
— the synthesis of information and management systems in decision-making processes.

RESEARCH ACTIVITIES

Landscape research of the Rosice-Oslavany area was done in the scale of 1 : 25 000 with recognition level of 3 500 hexagons serving as unit cells in data base. Results of geological, soil, forest phytocenoses, gemorphological survey, hydro-climatic data and detailed maps were accepted.

Landscape survey done in the fieldwork was focused to synergetic and synchoric links identification. Base landscape map of topochores in the scale 1 : 25 000 and applied map of man-land interactions in the scale 1 : 50 000 were prepared after detailed fieldwork.

Each hexagon representing area of 6.25 hectars has its own data vector-landscape components attributes. Computer EC 1033 was used for data storing and processing in the Brno University Computing Centre (K. Rais, M. Konečný, V. Račanský, M. Kundrata). Several experiments with computer interpretative maps in the form of implications, e.g. if certain soils, landforms, topoclimate, vegetation, etc., then certain hexagon is suitable for certain human activity, land use, were tried and printed.

Landscape of the Rosice-Oslavany area was portrayed through component analysis, synergetic and synchoric integration and land use, as a territorial system.

RESULTS

Landscape components differentiation

The analysis of landscape components — landforms, soils, reconstructed phytocenoses and land use was done with respect to former research and our land survey. We can find following landforms there divided after bedrock: crystalline rocks with different regolith, permocarboniferous sediments, neogene sediments, loess and loess-loam deposits, polygenetic slope and soil sediments; floodplains, gentle slopes, steep slopes, dells, gullies, througs. Soil cover consists of these soil types: cambisols, argilluvisols, phaeozems, chernozems, regosols, rankers, colluvisols, rendzinas, pararendzinas, pelosols, fluvisols, semigleys, gleys. Reconstructed phytocenoses: oak, beech-oak, oak-beech and fir-beech tiers, elm and alder-ash meads. And finally land use types: forestry, arable land, meadows, rough, gardening out door recreation, wildlife, orchards, settlement, devasted.

Topo-choric integration

A comprehensive interaction of landscape components, their synergetic links produced by matter and energy flows create landscape unit cells. Their spatial attribute is expressed as area. Relatively homogeneous landscape cells are connected with horizontal links to elementary choric units. They serve as base operational functional segments for land use.

Four types of topochores can be recognized in the landscape of the Rosice-Oslavany area:

— scalar with minimal changes within them, weak trend, low contrasts, stromatic, isotropic or slightly nebulous pattern
— gradient with gradual change, transitions, distinct trend, strong contrasts; series, chains, catenas, toposequences pattern
— vector in the form of axes, lines, phlebitic pattern, one way passage of flows caused mainly by runoff; strong contrasts, linear chains of paragenetic patterns
— mosaic caused first of all polygenetically, with superimposed responses of past processes, adjacent contrast sites weakly connected, anisotropic pattern; contrasts from weak to strong, ophthalmic, phlebitic, nebulous.

Microchores and their topochoric structure

Landscape of the Rosice-Oslavany area is a part of three mesochores: the Boskovice Furrow (D), the Brno Highland (E), the Bohemia-Moravian Highland (F). After synergetic and synchoric links among landscape components and elementary landscape units we can identify following microchores:

D1 the Rosice basin-graben
D2 the furrow diagonal ridge
D3 the Zbýšov flat hills
D4 the Ivančice basin
E1 the northern scarp
E2 the Bobrava river fault-line valley
E3 the southern scarp
E4 the Jihlava river fault-line valley
F1 the forested watershed track
F2 the central flat hills strip
F3 the Bílá Voda and Habřina streams throughs and ridges
F4 the Balínka throughs and ridges
F5 the Oslava river canyon-like valley.

Topochoric structure and land use of microchores

D1 floodplains with alder-ash mead, calcic and modal fluvisols, semigleyed; gentle slope and plains of beech-oak tier, permocarboniferous sediments covered with loess and loess-loam deposits, phaeozems and argilluvisols, scanty cambisols; ground water resources; arable land prevails, growing settlement

D2 gentle to steep slopes on permocarboniferous sediments covered with polygenetic slope and soil sediments, loess and loess-loams; dells and gullies are quite frequent; beech-oak tier with varied soil cover consisting of cambisols, rendzinas, pararendzinas, argilluvisols, pelosols, colluvisols, phaeozems; patches of floodplains like in D1; land use — arable, orchards, woodland, rough, out door recreation

D3 hilly land with gentle slopes, steeper in the south, plains in the north, on the permocarboniferous sediments with loess, loess-loams, polygenetis slope and soil sediments, argilluvisols, phaeozems, cambisols, rendzinas, pararendzinas, pelosols of bech-oak tier; strips of narrow floodplains similar to D2; land use: arable, settlement, meadows, orchards, coal mine and mine dumps

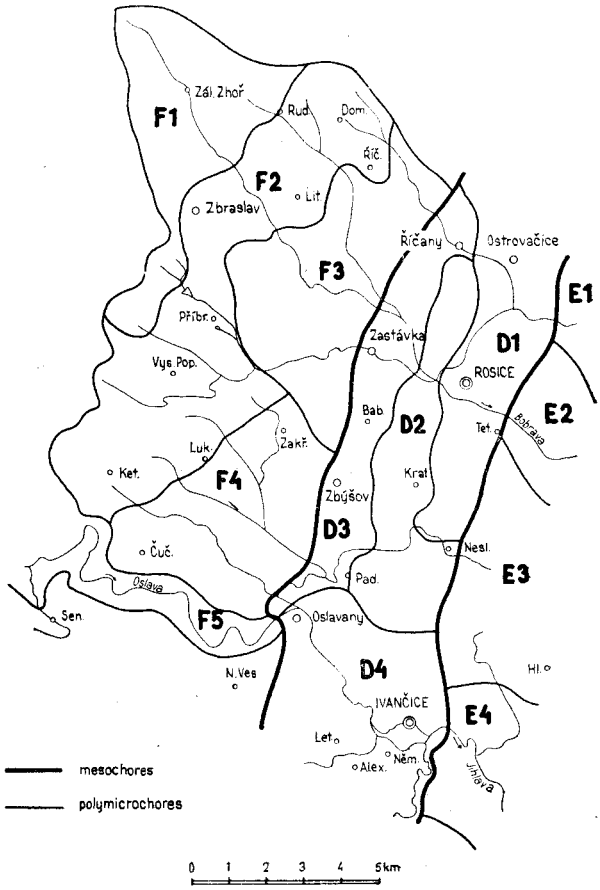

Fig. 1. Landscape microchores of the Rosice—Oslavany area

D4 oak tier with elm mead, vast floodplain, modal and semigleyed fluvisols, mostly cultivated (arable, meadows) and settled; upper gentle slopes and plains on neogene and permocarboniferous sediments, fluvial deposits (quarternary), loess with phaeozems, chernozems, argilluvisols, regosols, relicts of arenosols, rendzinas, pelosols, pararendzinas; ground water resources; land use: arable, orchards, settlement, recreation, devasted (waste deposits)

E1 + E3 the outside of the Brno Highland likewise brink slope of the Boskovice Furrow NW aspect, built of crystalline rocks (intrusive, silicate) with the

remnats of paleozoic sediments, covered with polygenetic slope and soil sediments; morphogenetically — fault line scarp (E3 Awatere type), steep slopes, ravines and throughs prevail; cambisols, colluvisols, rankers of beech-oak tier; forestry

E2 deep narrow graben, canyon-like valley cut in granitoids; floodplain strip with semigleyed fluvisols of alder-ash mead; steep slopes prevail with different

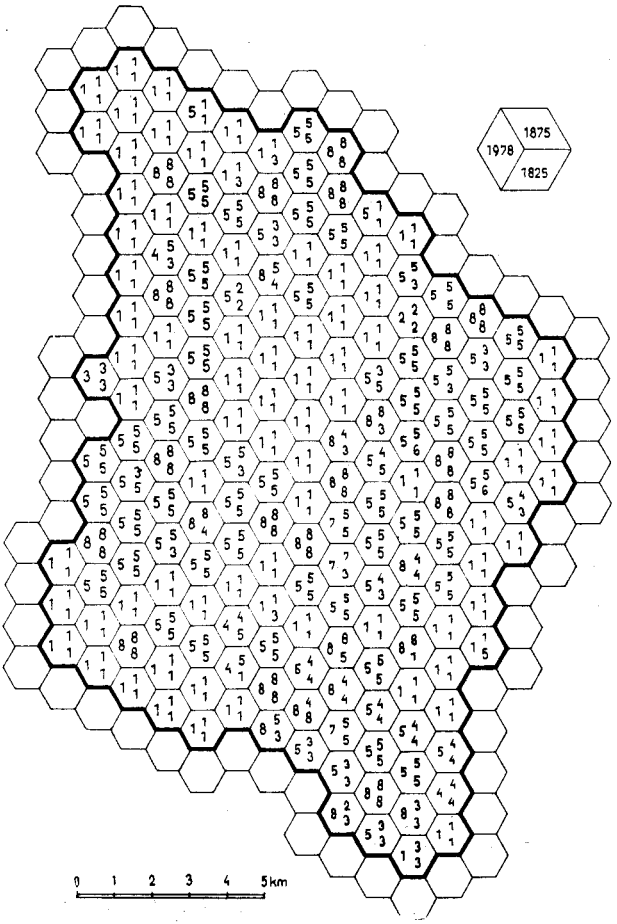

Fig. 2. Land use development in the Rosice—Oslavany area
Explanation: 1 — forests, 2 — rough (scrub), 3 — meadows, 4 — orchards, 5 — arable land, 6 — surface water, 7 — devasted land, 8 — settlements

aspect cut by ravines and througs; cambisols and rankers, patches of argilluvisols, colluvisols; beech-oak tier on S slopes orientation, oak-beech tier on N slopes orientation; surface water resources; forestry prevails

E4 the graben with less uplifted granitoid blocks (relatively steps-like, descended), plains in the summits of blocks, slope sides being steep, lower part is cut in granitoids with very narrow floodplains; neogene and quarternary sediments

are occuring (sands, gravels, loams), polygenetic slope and soil sediments, cambisols, regosols, argilluvisols, rankers, colluvisols; oak and oak-beech tiers; surface water resources; land use — forestry, orchards, recreation, rough, transport passage

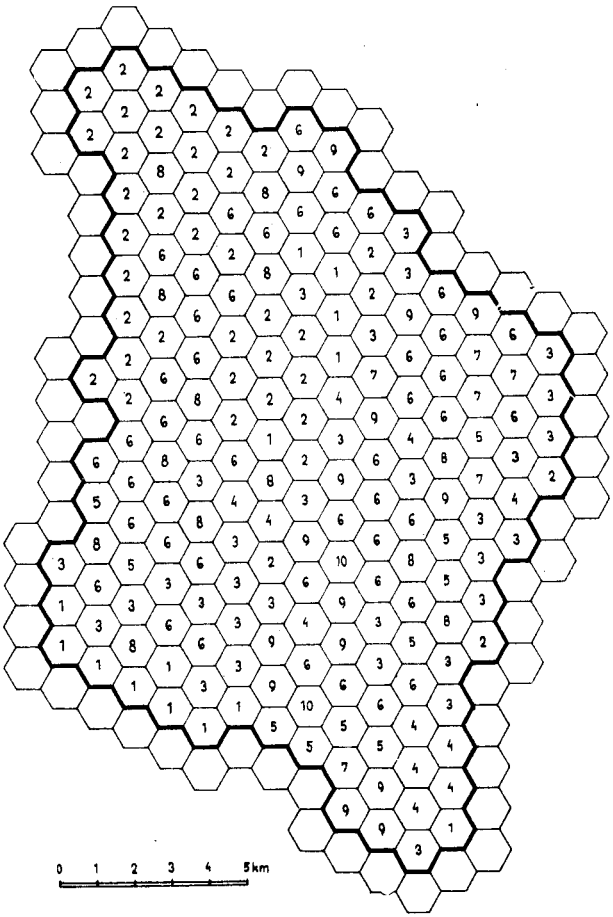

Fig. 3. Man-land interaction in the Rosice—Oslavany area (explanation in chapter "Conclusion")

F1 plains and gentle slope of watershed and upper drainage basin of the Bobrava river with the 1st up to 4th order of streams, built of west moravian crystalline series (silicate oligobasic to mesobasic) with polygenetic weathering mantle (clayed, sandy, loamy, stony) in local depresion and concave slopes tracks; bedrock exposed on ruwares of etchplain relief, slow runoff, lower evaporation, wetland patches transional to bogs, springs area with pseudogleys, semigleys, gleys, organosols, cambisols, rankers, argilluvisols; fir-beech tier; forestry prevails

F2 aforestated area of low hills with gentle slopes on the west moravian crystal-

line series; relief and regolith similiar to F1 but more loess-loamy deposits; rather drier than F1, oak-beech tier with cambisols, argilluvisols, rankers, pseudogleys; narrow patches of floodplain with alder-ash mead; dells and gullies network developed; land use — arable, settlement, meadows, forestry, recreation, orchards

F3 landforms on crystalline series are very contrast — wide plains and gentle slopes of ridges (etchplain relief), steep slopes cut by ravines of the valleys with different width of floodplain, deep troughs like valleys; the former ones having polygenetic regolith, slope and soil sediments with cambisols, rankers, pseudogleys, argilluvisols of beech-oak tier, the atter down the valley on the upper edges with cambisols, rankers, colluvisols, beech-ak and oak-beech tiers at the different slope aspect; forestry prevails

F4 a fringe of oak tier from the Ivančice basin, and beech-oak one on the crystalline series covered with polygenetic regolith and cenozoic sediments (sands, loess-loams); cambisols, colluvisols, regosols, argilluvisols; very diverse landforms--plains, gentle and steep slopes, ravines, troughs, dells, narrow patches of floodplains; land use is also diverse — arable, forestry, orchards, meadows, rough, settlement, out door recreation

F5 outstanding beauty area, canyon cut in crystalline series with steep valley sides and rock walls, incised meanders with changing width of floodplain (alder--ash mead); cambisols, rankers, colluvisols, lithosols; left valley side belongs to oak tier, less forested, rough prevails, scrubs, rather devastated, right valley side has phytocenoses of beech-oak and oak-beech tiers (forestated); the Oslava river and the Chvojnice stream confluence is well known out door recreation area: surface water resources.

CONCLUSION: MAN-LAND INTERACTION

We tried to answer a question on suitability, assessment and decisions in landscape management.

Identifying 10 groups of man-land interactions we are offering evaluation and proposition for futher development:

(1) forestry, recreation, wildlife — these polyfunctional segments are mainly in F5 but such combination is lacking of managerial process. F3, E1, E3 and some tracks of E2 + E4 are suitable for mentioned use, too

(2) forestry, recreation, water management — developed in F1 but not adjusted, having reserves in recreation; F1 microchore is very suitable for this polyfunctional use

(3) forestry, preventing the erosion — occuring in D1, D2, D3, D4 (forestated gullies, E1, E2, E3, E4 (steep slopes, fragile dystric soils), some patches also in other microchores. An effective adjustment of partially destroyed soils

(4) rough, gardening, recreation, orchards — another good approach use of devastated or dystric landscape segments, maintained in each microchore though question of managerial process has been remaining

(5) arable land and meadows intesivelly cultivated, important landscape segments for food production, mainly in D microchores; problems in shortening, decrease of productive land by settlement growth, it is balanced by changing orchards to arable land (D4) with worse quality of soils; similar process is spread all round the area

(6) arable land with accelerated erosion — extended mainly in D microchores

and F2 + F4. Adjustment process is not an effective one, though occuring

(7) arable land and meadows with flood hazards-chalanged by decline of area under cultivation and caused by settlement growing; displayed in D1, D4, some patches in E2, E4, F3, F4 as recompensation, reclamation of arable land lost, spreading upon former meadows

(8) settlement with good environmental quality — mainly in F microchores with weak industrial influence on environment; low inhabitants concentration

(9) settlement with worse environmental quality — in D microchores from Říčany in the north, to Ivančice in the south, caused by mining, energy production, waste deposition

(10) devastated — a result of man's activity as accelerated erosion in D1, D2, D3, D4, E4, F2, F4, mining dumps and waste deposition in D3, D4.

Mentioned problems in man-land interactions are a challenge to adjustment of wildlife conservation, devastated land reduce, environmental quality of settlement, out door recreation development, hydrocycle improvement, etc.

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