SCRIPTA FAC. SCI. NAT. UNIV. PURK. BRUN.
Vol. 15 (1985), No. 3 (Geographia), p. 139—158



# THE FRYŠÁVKA DRAINAGE BASIN STRATEGY AS PROPOSED BY GEOGRAPHICAL WORKSHOP GROUP OF BRNO UNIVERSITY

## (2nd Approximation)

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Received for publication: June 1984

Geographical Workshop of Brno University (GEWOBRUN), the authors are the members, has taken part in research of the Fryšávka drainage basin sponsored by Professor V. Vaníček in the framework of his concept the Fryšávka Strategy as a subnational level project — a contribution to World Conservation Strategy. Geographical inquiry consisted in portraying physical landscape, settlement, population, land use and future prospect of nature conservation and socioeconomic development. Main field of research was in spatial-temporal processes and structures investigation focused on theoretical and practical purposes: how to manage, or adjust a landscape with respect to conservation and development. History of land use was studied from the 14th century, especially spatial diffusion of innovations, population data starts in the year 1850. Landforms, runoff, soil cover, vegetation and physical spatial units on site (top) and elementary choric levels are recognized and an attempt of identification is made. Some concepts of graph theory are applied in the sense of physical cascade systems. The output of inquiry consists on ecomicrochores proposition. They are spatial units, some of them being respected in landscape management, the others are offered for landscape adjustment, both are very closed to the concept of World Conservation Strategy: to conserve the nature and societal development. The authors are working out spatial organization development of the Fryšávka drainage basin in the next approximation.

## ACKNOWLEDGEMENTS

The authors wish to thank persons and institutions currently concerning with question of environmental management for help and support of GEWOBRUN or for their active engage in consultations, data collection, etc. We hope the comprehensive review will be undertaken by the Fryšávka Strategy sponsor Professor Vaníček in special volume.

We would like to thank the Institute for Forest Management and Forest Planting of Nové Město-town na Moravě, District Agricultural Management in Žďár-town nad Sázavou, Museum of Nové Město-town na Moravě, the Institute of Hydrometeorology in Brno, Directory of the Žďárské vrchy-hills Protected Landscape Area in Žďár-town nad Sázavou, M. Sc. V. Dolníček, M. Sc. Z. Tarabová, M. Culek, T. Ehl, M. Sc. M. Minxová, M. A. R. Stránská, M. Sc. I. Holoubek, J. Janoštíková.

GEWOBRUN served as a forum for the expression and exchange of ideas, results, views, sketches, discussions. It was held by the Physical Geography and Cartography Section of the Department of Geography, Faculty of Science, J. E. Purkyně University

of Brno in the office and in the terrain of the Fryšávka drainage basin irregularly from May 1982 to May 1984. It is hoped that Gewobrun will encourage further scientific enquiry into problems of the Fryšávka drainage basin strategy.

## INTRODUCTION

The term 'Fryšávka Drainage Basin Strategy' has been adopted following the connotation used by Professor V. Vaníček the Fryšávka Strategy as a Czechoslovak subnational contribution to World Conservation Strategy.

In spite of the fact that World Conservation Strategy is the product of great intellectual effort and provides practical guidance for nature conservation, there are certain compromises lowering the level of implementation. First of all it is a general framework concerning to 'human survival'. The problem of environmental conservation as a global one is linked with other global problems after the Present Global Problems ed. N. N. Inozemcev (1981):

- preventing the world nuclear war as a main problem of mankind
- inequality persistence of highly and less developed countries as nodal contemporary problem
- the world population growth
- hunger and poverty remove
- natural resources and energy supplies
- sea use
- Cosmos space use
- man/nature interaction in the international context
- mankind future.

Professor V. Vaníček, the J. W. Goethe European Prize Winner for Nature Protection and Landscape Development, assembled more than 20 voluntary research teams and experts on Environmental Protection for prospect of the Fryšávka Drainage Basin management applying the concept of World Conservation Strategy. The aim of "Fryšávka Strategy" is to propose solutions of society/nature interaction to maintain even improve natural landscape-processes and land use. The area was chosen as a research field first of all for its natural and scenery values, cultural landscape quality preserved in specific former land use spatial arrangement, present and future high suitability for recreation, forestry and agriculture. It keeps on an importance in hydrocycle being the water source for the lower Svratka-river industrial and agricultural functional highly populated landscapes of South Moravia. A number of unique landscape segments, outstanding beauties, irrevocably lost in other landscapes have been conservated here, many of them relevant for optimal natural processes functioning, landscape dynamic homeostasis.

The scope of environmental conservation strategy is very wide and multidisciplinary cooperation. For the contemporary geography is a cluster of subdisciplines with less mutual links, the idea of geographical workshop was put into practice.

## INQUIRY FIELD

For a clear and simple orientation in our research the following solution is at hand in the form of blocks, abbreviations and their explanations:
GEWOBRUN — geographical workshop of Brno University
WOCOST — world conservation strategy

FRYST — Fryšávka strategy — the concept of Professor Vaníček as a subnational Czechoslovak contribution to WOCOST

Fryšávka — the 3rd order stream, length 16.5 km, tributary of the Svratka-river, the 4th order stream

FRYDBA — Fryšávka drainage basin with catchment area 66.5 sq . km, situated in the Žďárské vrchy-hills, part of the Bohemia-Moravian Highlands

FRYDBAST — Fryšávka drainage basin strategy, concept of GEWOBRUN stressing drainage in natural processes and transition former physical landscape to the cultural landscape of catchment area

SOCON — societal context, socioeconomic development

SCICON — scientific context, multidisciplinarity

SPOPVAN — sponsor of FRYST Professor V. Vaníček

RESTES — research teams working out FRYST, persons, institutions

SPOR — spatial organization

LASOD — land adjustment spatial organization development

NESO — natural environment spatial organization

SESO — socioeconomic spatial organization

LANDMIS — land management/information system

AIS — areal information system, the official information system for areal planning, offered by Terplan — terrain planning.

The work of GEWOBRUN consists of seminars, panel discussions, team-work, terrain survey, tasks solving, etc. It is led by A. Hynek, the head of physical geography and cartography section. FRYDBAST is one of the projects undertaken by GEWOBRUN.

GEWOBRUN approach is based on complexity to be at hand in geography — physical, socioeconomic, regional, general and applied. The proposed conservation of nature should be based on optimal information system for management,

| | SPATIAL SOCIOECONOMIC PROCESSES | SPATIAL NATURAL PROCESSES | SPATIAL MAN/LAND INTERACTION |
|---|---|---|---|
| | | MACRO-WORLD MESO-LEVEL SPACE-TIME PROCESSES | |
| SPATIAL SOCIOECONOMIC DEVELOPMENT | SPATIAL ORGANIZATION | SPATIAL OPERATIONAL UNITS | MAN/LAND INTERACTION ADJUSTMENT |
| | | GEWOBRUN | SONCOSD |
| WOCOST | FRYST | FRYDBA | FRYDBAST |
| SOCON | SPOPVAN | SPOR | LASOD |
| SCICON | RESTES | NESO | LANDMIS |
| | | SESO | AIS |

decision-making, adjustment. The need of data on nature, society, production, environment, man/land interaction as attributes of spatial units is shaped by GEWOBRUN co-operating with SPOPVAN and RESTES.

The problem of environment, nature conservation is not the only societal problem, but their solution is linked with other solved problems on global, regional and local levels. Dominant role is played by social relationships in the socioeconomic development with regard to needs and aspirations of future generations respecting landscape as a heritage.

## ASPIRATIONS

GEWOBRUN researches the spatial organization of nature, society and relations, interactions, too. We try to link physical and socioeconomic geography on general, regional and applied levels. A starting point of research was found in the landscape survey of the Dyje-river Znojmian landscape topochores (A. Hynek, P. Trnka, 1981) keeping on the Rosice-Oslavany area, the Bohemia-Moravian Highlands, Czechoslovak natural landscape mesochores, etc.

Landscape studies are understood as portraying the landscape in cross-section investigation including:

— landscape as heritage, especially the past work occuring in its design

— landscape perception, scenery, resources

— physical landscape processes and forms, spatial and temporal attributes of landscape, synergetic and synchoric links between components and complexes

— landscape or land use development, man's impact on landscape, physical/socioeconomic processes interaction, leading role of socioeconomic processes, landscape evaluation, cost/benefit ratio

— socioeconomic spatial organization of landscape, its origin, development and future prospect

— man/land interactive processes management or adjustment, spatial organization of landscape development, man/land adjustment, social goals and nature maintainance coordination, location/allocation tasks

— landscape design as spatial organization of landscape in the framework of socioeconomic development/nature conservation

— information system on landscape for management, adjustment.

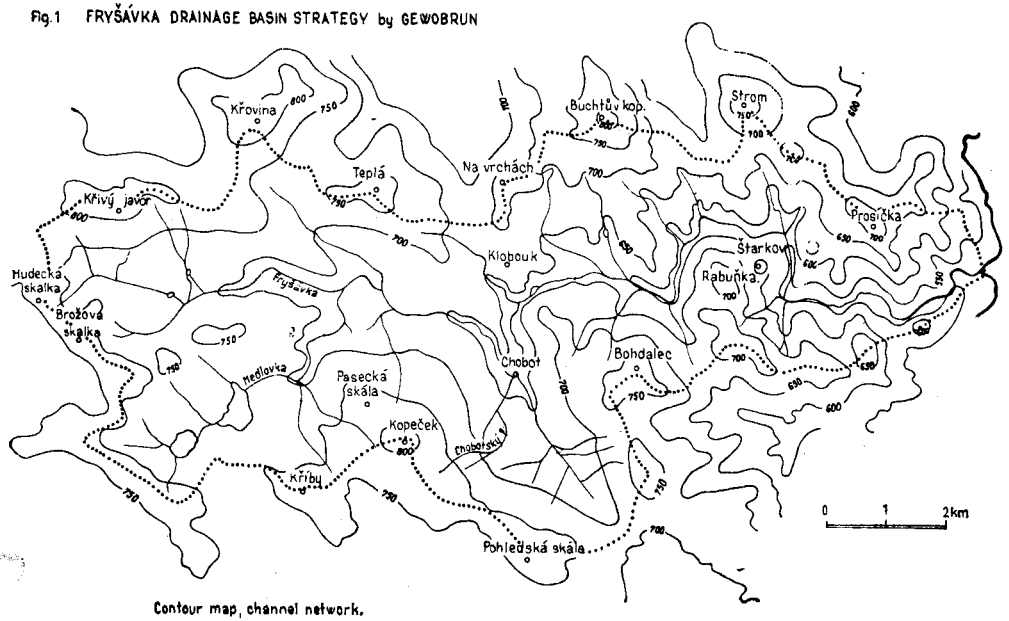
## PHYSICAL LANDSCAPE OF FRYDBA

According to regional divisioning of relief FRYDBA is a part of the Žďárské vrchy-hills reaching over 800 m above sea level. The length of FRYDBA from the West to the East is about 16 km, valley floor gradient 17 m per 1,000 m from 770 m to 495 m. The width is about 8 km, total area of 66.5 sq. km.

Ridges and hills on the watershed reach on Křovina 830 m, Křivý javor 824 m, Kopeček 822 m, Pasecká skála-rock 819 m, Pohledecká skála-rock 812 m, Buchtův kopec-hill 813 m (Fig. 1) mainly with planation surfaces or their remnants — tors, strongly influenced by cryoplanation and fluvial processes. Watershed line is mostly above 700 m.

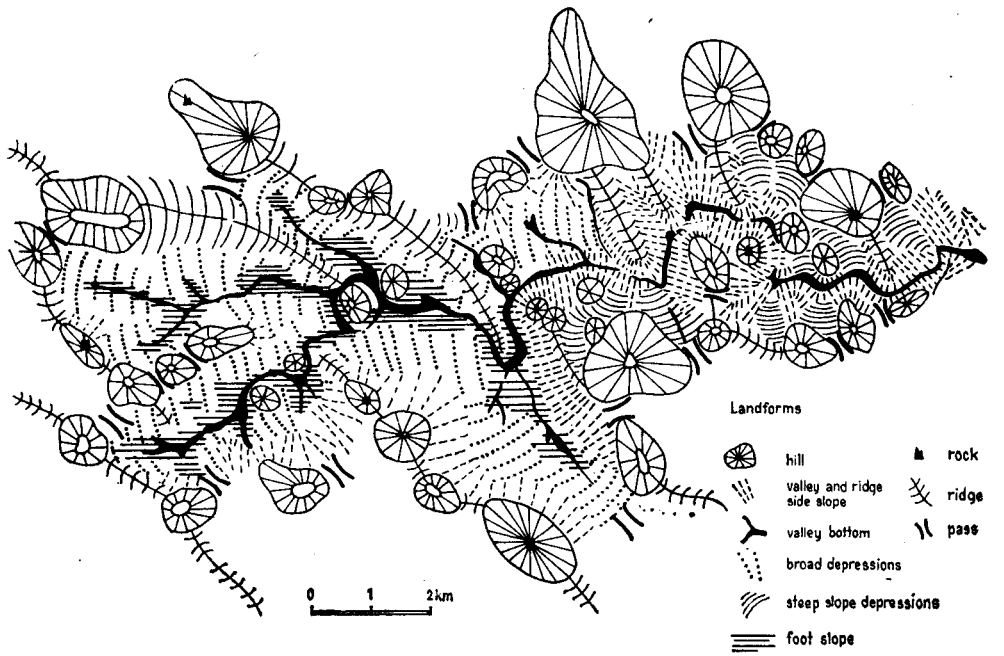
The Fryšávka-stream rises in the pass on the main watershed 770 m and flows eastward to the Svratka-river, their confluence is in Jimramov-town at 495 m.

Fig.1 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN




Contour map, channel network.

Fig.2 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN



FRYDBA bedrock is mesozonal metamorphic crystalline groups svratecká and strážecká: mostly felsic, silicate crystalline schists, mica-schists, red biotite-muscovite orthogneisses, migmatites, amphibolites, metacarbonate complex, less occur — erlans (skarns) and serpentinites. Bedrock bodies are elongated from WNW to ESE, bordered with faults, the other fault line is running rectangularly. The bedrock is divided into single blocks with inclination or steps falling into Fryšávka valley, in the lower part of FRYDBA eastwards. These faulted blocks were uplifted, some blocks were tilted. They have been shaped by fluvial processes, in pleistocene glacial periods by frost action. There are responses of cryogenesis, but warmer and wetter pleistocene and earlier periods, too. So we can find tors, cryoplanation terraces, felsenmeer and chromic regolith.

Hills and ridges pattern is showing the influence of parallel and rectangular faults, the same pattern of line courses is developed in the cases of streams and valleys depressions (Fig. 2). The slopes are mostly linked with faults — fault scarps and fault-line scarps prevail.

Regolith on bedrock is mostly stony, sandy and silty, only sporadic remnants of clay weathering occur on small patches. Silty regolith weathered due to pedogenesis on some areas into argillic horizon of argilluvisols. Stony and sandy slope sediments with silt admixture prevail, they are mostly oligobasic/mesobasic.

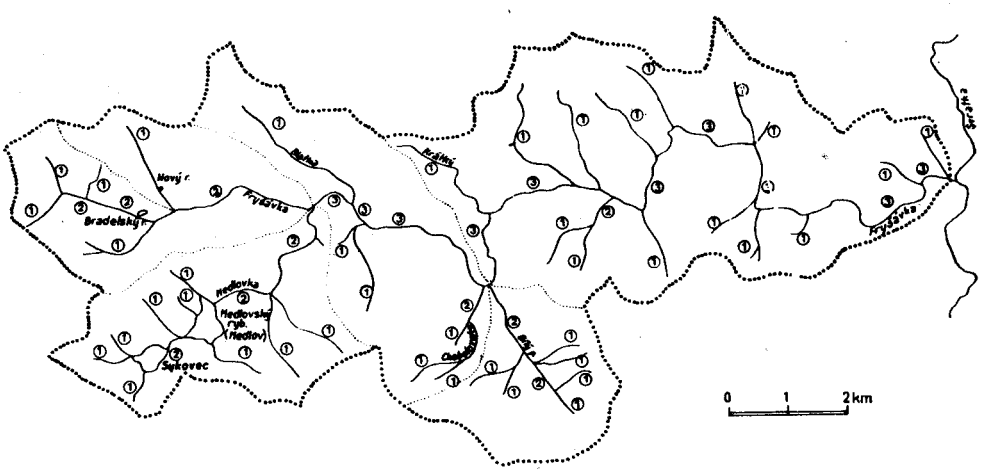
FRYDBA belongs to important hydro-economic areas. The mean annual yield runoff is about 12 litres . $s^{-1}$ . $km^{-2}$ with range from 3 to 48 litres. The mean total annual precipitation is about 720 mm and total mean annual amount of water in precipitation reaches 48,000,000 $m^3$.

Channel network can be divided to two types (Fig. 2):

— upper Fryšánka, Medlovka, Bílý potok streams with dense channel network, higher yield runoff

— the rest of FRYDBA down the upper Fryšávka and Bílý potok-stream drainage basin with less dense channel network, lower yield runoff. Fig. 3

Fig. 3 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN




Streams order according to the Strahler system

portrays FRYDBA segment, tracks with overland flow — first order basins and interflow areas.

Some parameters of FRYDBA hydrocycle are measured by the Institute of Hydrometeorology at stream gauging stations: stream stage in Kadov and Jimramov. Kadov station catches the hydrocycle of the upper Fryšávka and Medlovka streams with area 22.5 sq. km. Mean annual discharge Q in Kadov, in $m^3 . s^{-1}$, and total annual water amount, in $m^3$ per a year:

1980 ... 0.338 ... 10,695,168
1981 ... 0.295 ... 9,303,120
1982 ... 0.278 ... 8,767,008
1983 ... 0.285 ... 8,987,760

$Q_{min}$ was 0.07 $m^3 . s^{-1}$ i.e. minimal yield runoff $q_{min}$ 3 litres $. s^{-1} . km^{-2}$ while mean annual yield runoff ranges between 13—16 litres $. s^{-1} . km^{-2}$, mean monthly q = 3.9 — 50 litres $. s^{-1} . km^{-2}$. Monthly minimal q was in August 1983: 5.2 litres $. s^{-1} . km^{-2}$, monthly maximum q in March 1981: 50 litres $. s^{-1} . km^{-2}$, the absolute culminate q was in March 1981: 300 litres $. s^{-1} . km^{-2}$.

Jimramov station reflects the hydrocycle of the whole FRYDBA and middle and low FRYDBA can be calculated for 44 sq. km. Middle and low FRYDBA total annual water amount in the years was:

1980 ... 16,682,544 $m^3$
1981 ... 15,231,888 $m^3$
1982 ... 12,866,688 $m^3$
1983 ... 12,109,824 $m^3$

Annual q ranges between 9 to 12 litres $. s^{-1} . km^{-2}$, mean annual discharge Q = 0.4 — 0.5 $m^3 . s^{-1}$, $H_0$ = 350 mm i.e. runoff reaches 48 % precipitation. Monthly $q_{max}$ was in March 1981: 46 litres $. s^{-1} . km^{-2}$, monthly $q_{min}$ in. August 1983: 1.6 litre $. s^{-1} . km^{-2}$.

FRYDBA as a whole had Q, in $m^3 . s^{-1}$, and total annual water amount, in $m^3$:

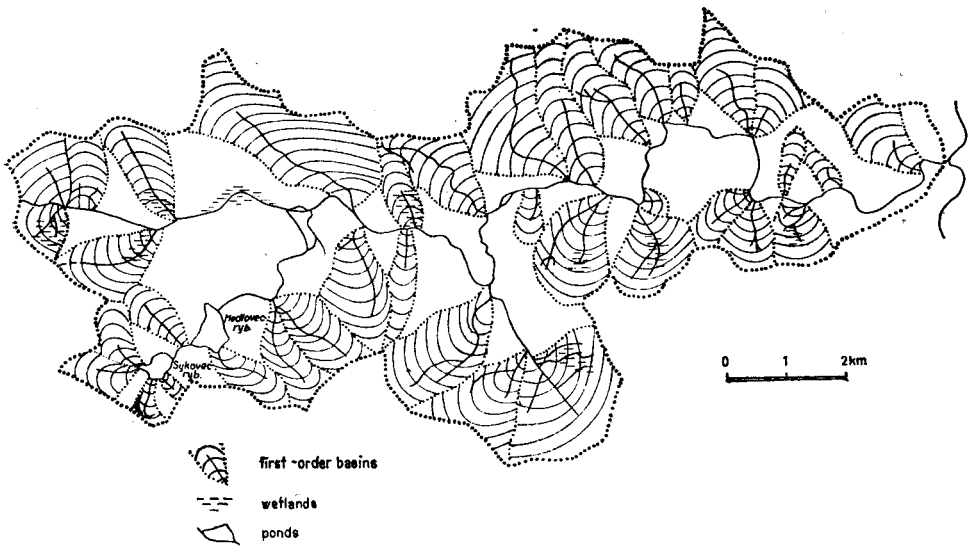
1980 ... 0.867 ... 27,341,712
1981 ... 0.778 ... 24,535,008
1982 ... 0.686 ... 21,633,696
1983 ... 0.669 ... 21,097,584

$Q_{max}$ = 17.5 $m^3 . s^{-1}$, $Q_{min}$ = 0,15 $m^3 . s^{-1}$, $q_{max}$ = 270 litres $. s^{-1} . km^{-2}$, $H_0$ = = 350 mm. Mean annual q range: 10—13 litres $. s^{-1} . km^{-2}$, monthly mean q: 3—48 litres $. s^{-1} . km^{-2}$, monthly $q_{min}$ in August 1983: 2.8 litres $. s^{-1} . km^{-2}$.

FRYDBA is serving as a reservoir of water, one of the basic natural resources essential to man's activities, providing water supplies for mentioned middle and low the Svratka drainage basin. FRYDBA has high storage capacity of water, especially in three subbasins: upper Fryšávka, Medlovka and Bílý potok.

Climate of FRYDBA compared with densely populated areas of Czechoslovakia is colder and wetter. Winter is snowy with good conditions for skiing, during winter is gradually water supply formed in snow cover. Summer is not warm and long, but sufficient for crop farming: potatoes, oats, rye and good enough for recreation with bathing in ponds of Sykovec and Medlovský. Evapotranspiration

Fig.4 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN




strongly decreases in the heights above 700 m. Local air pollution increases in bigger villages, the fall of acid rains, $SO_2$, not local origin threaten summits of ridges and mainly of hills as Pasecká skála, Buchtův kopec, etc. with fragile geoecosystems.

Interfluve areas occupy upland surfaces of ridges and hills, mostly covered with forest, mainly in the western "horse shoe" forest from the Blatka-stream via the upper Fryšávka-stream, the Medlovka-stream to the Bílý potok-stream: Pohledecko-pasecké forests, Fryšávka forest and Kadov forest. The former vegetation cover of acid fir and spruce-beech forests developed on acid cambisols, rankers, colluvisols, while on pseudogleys, stagnogleys and gleys were acid fir, spruce-fir and fir-spruce forests. They were cut down and former 100 % forest cover was lowered to 50 %. It is maintained from the half of 19th century. Former forests were the source for wooden-coal, mainly beech. Mentioned forests were changed in species pattern like the forests covering ridges and hills of lower FRYDBA: Bohdalec forest, Rabuňka forest, Strom-Prosíčka forest.

In the colonize innovate diflusion starting in the 14th century the forests on lower ridges near the Fryšávka-stream and slope sides of southern aspect were transformed into farm land. Their soil cover includes cambisols, argilluvisols, pseudogleys reclamated to productive soils. Former strips of fields bordered with hedges were lately integrated into blocks and cultivation caused accelerated soil erosion.

Plant communities diversity was also lowered, mainly on cropland patches and tracks of FRYDBA landscape. But we can see regressive land use with renaturalization: cropland to grassland and to forest which increases plant communities diversity. Some agricultural landscape segments still maintain plant

corridors, strips, patches, hedges in the area of villages Kadov, Krátká, Kuklík, Odranec, Líšná, Nový Jimramov. There are some patches with scarce plant communities:

— relict rock pine woods on pararendzinas, serpentinites, or on rock walls and summits of hills and ridges
— ash-maple woods on colluvium, colluvisols, and in ravines, gullies.

Fig.5 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN

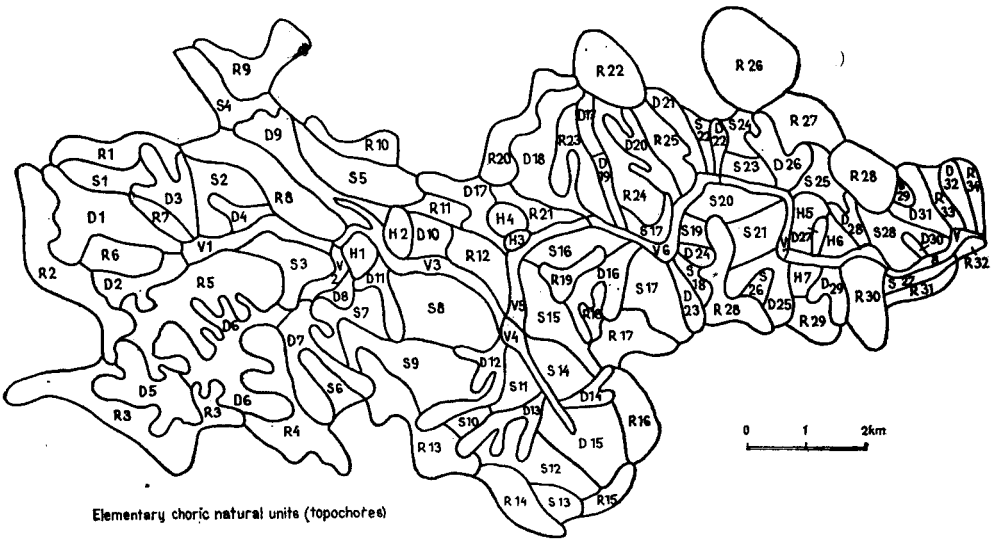
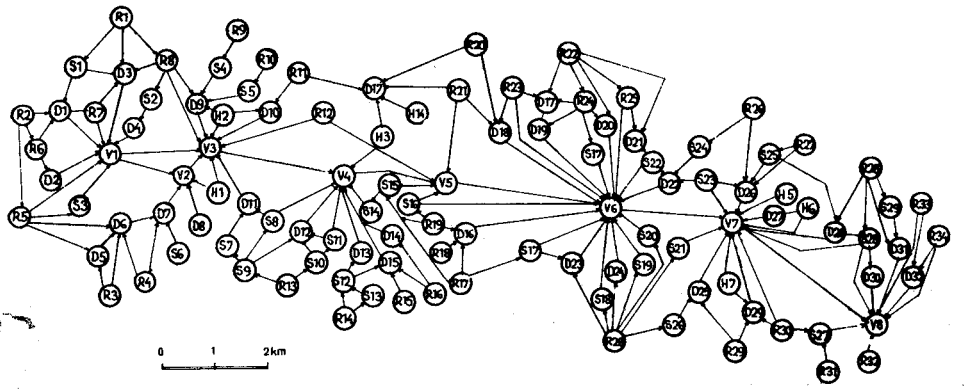



Fig.6 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN




Graph of water and debris - slope cascades (according to Fig 5).

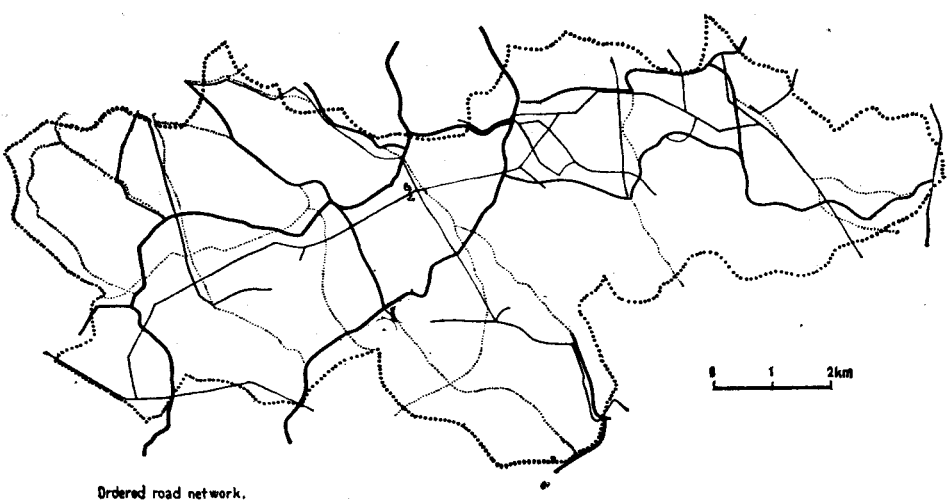
Wood species diversity of forest communities is very low: spruce monosilviculture prevails with straggled beech, fir, larch, pine, birch, maple.

We have tried to find spatial organization of physical landscape processes. Applying the approach of R. J. Chorley and B. A. Kennedy (1971) we recognize runoff and debris cascades Fig. 6 which link elementary physical landscape choric spatial units — topochores, after A. Hynek (1978, 1981). Graph is showing links, fluxes among ridges, hills, side slopes, depressions and valley floors through a hydrocycle. But there are several cascades and other natural processes not identified.

## LAND USE, SETTLEMENT AND POPULATION DEVELOPMENT

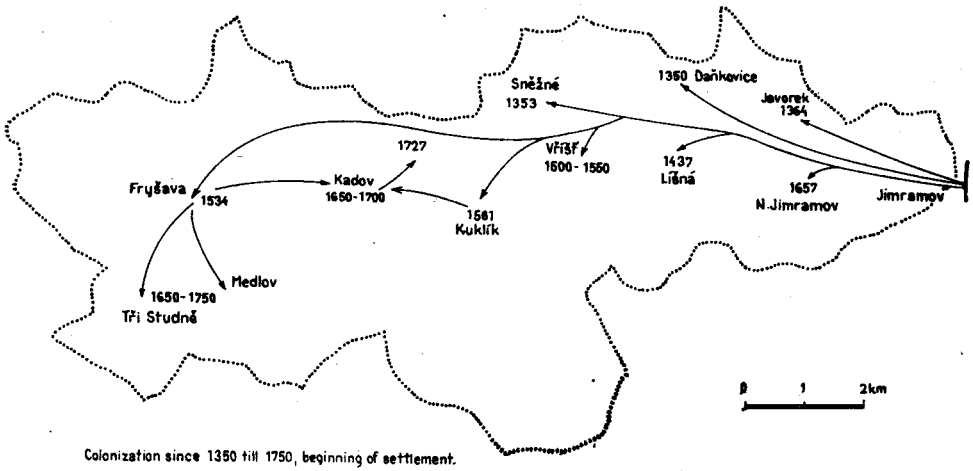
The landscape before man's coming was a forested landscape gradually changed since the 14th century to anthropofunctional landscape connotated as cultural. Colonization as a spatial diffusion wave consisted in forest remove and transformation into settlement, cropland, and meadows patches. The Fryšávka stream and its valley floor was a natural axis used as a basic line in transport network and socio-economic development. The colonization progressed from Jimramov-town up the Fryšávka-stream and as it was an agrarian one, the mills were built, initial points and nodes of anthropo-funcitional landscape. This 1st spatial diffusion wave is shown in Fig. 8.

Fig.7 FRYŠÁVKA DRAINAGE BASIN STRATEGY by OEWOBRUN



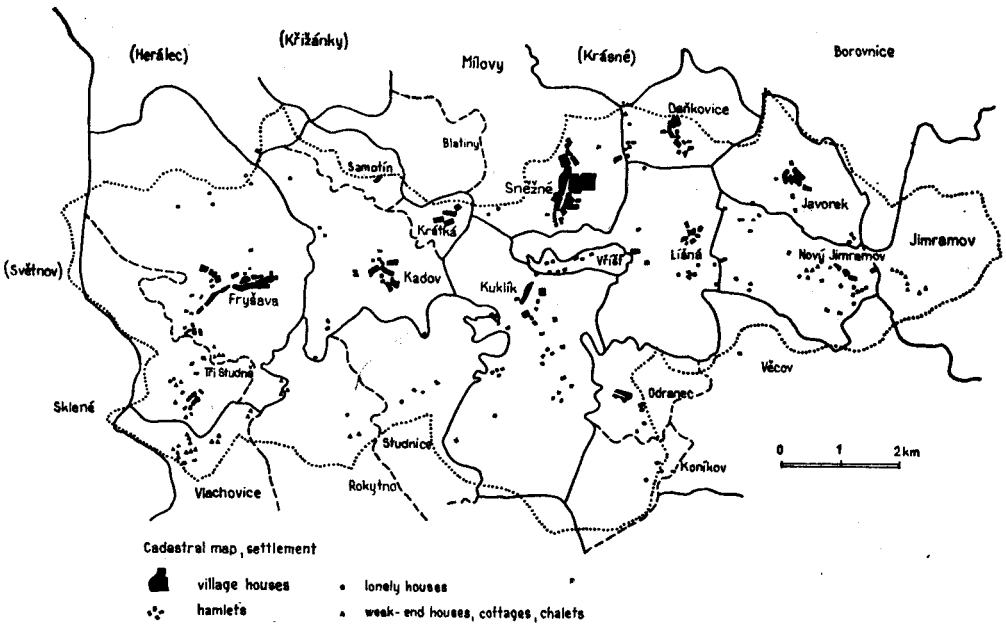

The agrarian spatial diffusion reached its top in 15th—16th centuries when wood, paper, glass and iron were produced. It was changed in the 2nd spatial diffusion wave of innovation which transformed the former landscape by location of iron works, hammers, ore mines, limestone quarries and a number of charcoal piles.

Fig.8 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN



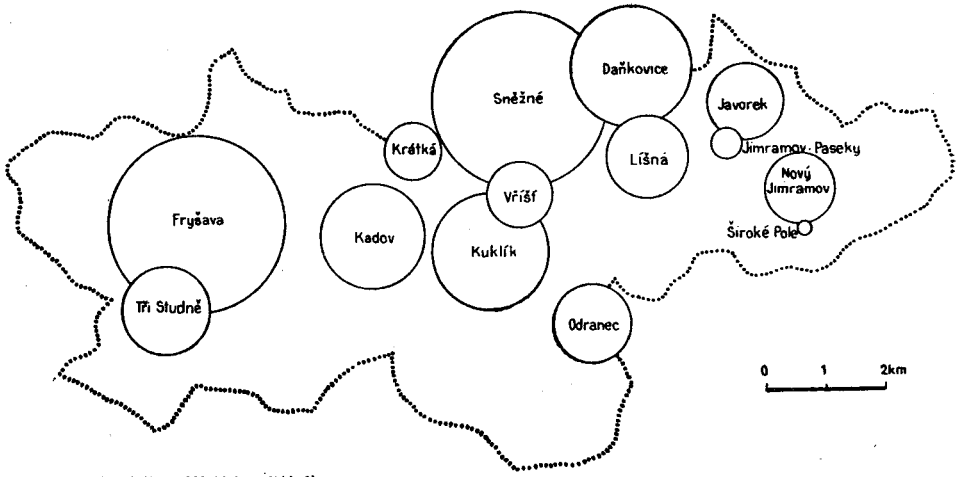

Colonization since 1350 till 1750, beginning of settlement.

Fig.9 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN




The Protocol of the Juridical Estimation of Javorek-village from the year 1631 may be quoted: "The interests of money 3 gold coins, 14 groschens and 3 d. a year was paid to the authority by serfs. They rated 22 groschens from the fields, 1 g.c. + 6 gr. for the watch-tower, then 390 gallons of oats,

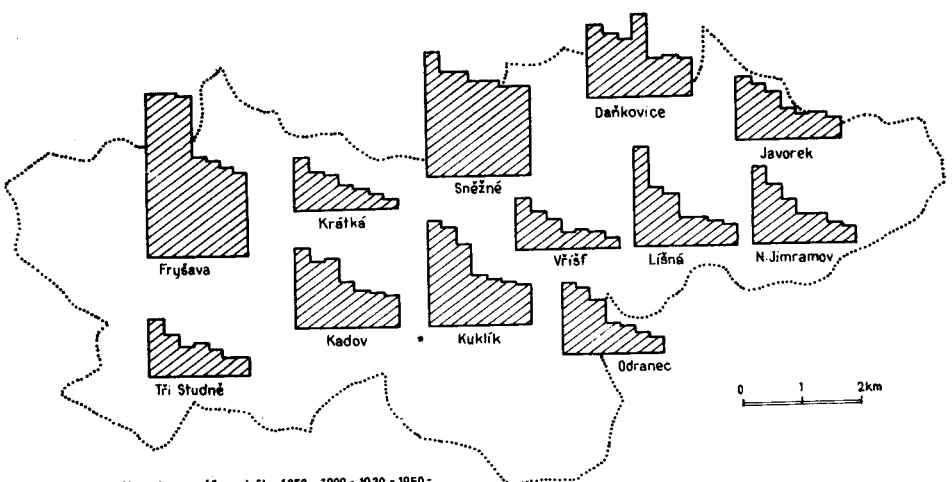
Fig.10 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN




Population, 1980 (data in Table 1).

i.e. 10 gr. + 50 d. Corveé duties were very high, therefore estimated at 25 g.c. The serfs laboured for 50 days with horses, harvested on foot for 32 days, reaped oats for 10, raked oats for 12, mowed meadows for 20, made hay for 22, gathered and breaked flax for 32, hoed cabbage for 10, washed and sheared sheep for 20, went hunting for 20, weeded in the gardens for 12, deposited corn at layers for 6, threw out manure from cow-sheds for 2, spread out manure for 6, sowed corn for 2, picked hops for 2 days. In addition to it they spun 23 pounds of flax and made 44 fathoms-piles of wood.

Fig.11 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN




Population change (from left: 1850 - 1900 - 1930 - 1950 - 1961 - 1970 - 1980, data in Table 1)

Fig. 12 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN

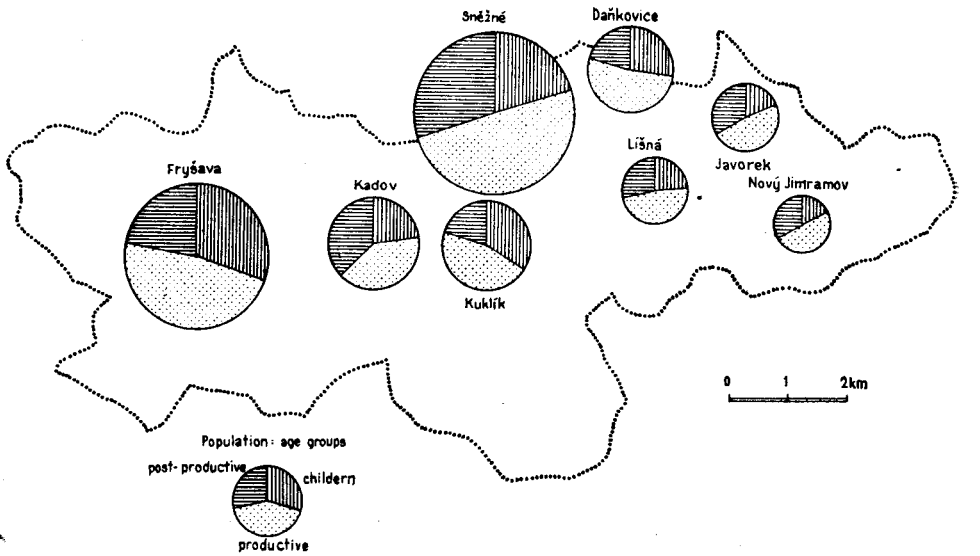
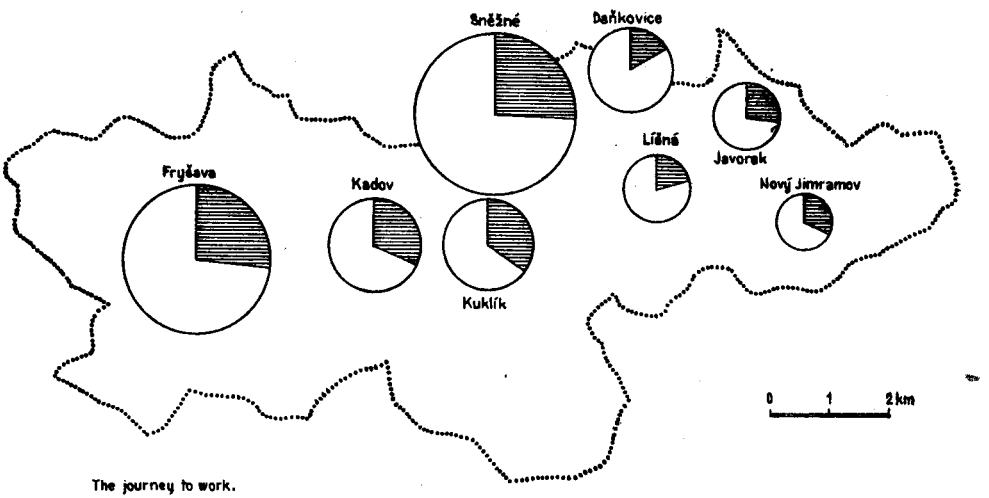



Fig. 13 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN




The journey to work.

In another quotation from the 2nd half of 17th century duties of the serfs at the ironworks in Kadov-village were set for 11 men thus "they brought 20 baskets of coal at about 1,000 paces'distance, each of them 2 baskets a week, which could be done in half a day. Each of them had to carry over 3 piles, the eleventh one brought roofing to the charcoal-piles, also half a day. As well as they carried 6—7 pig iron from the blast furnace in Kadov-village to the

Fig. 14 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN

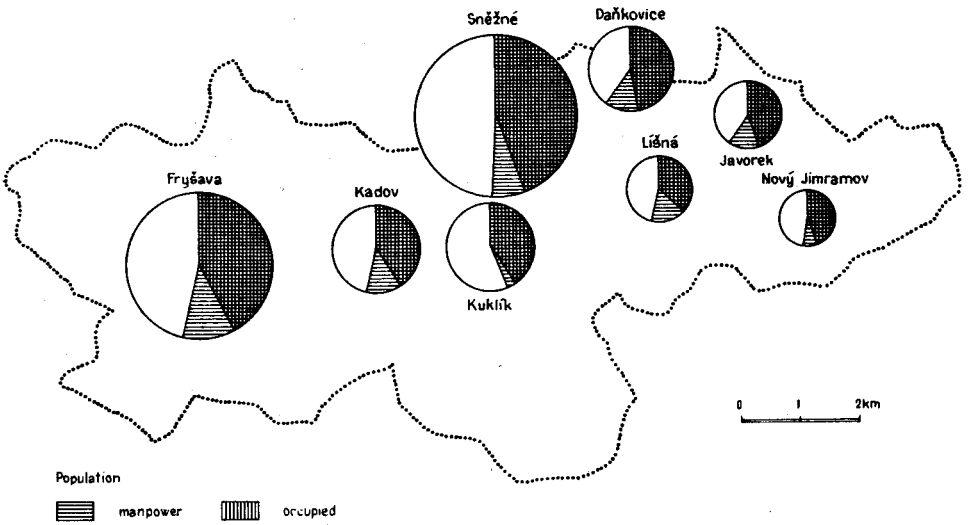
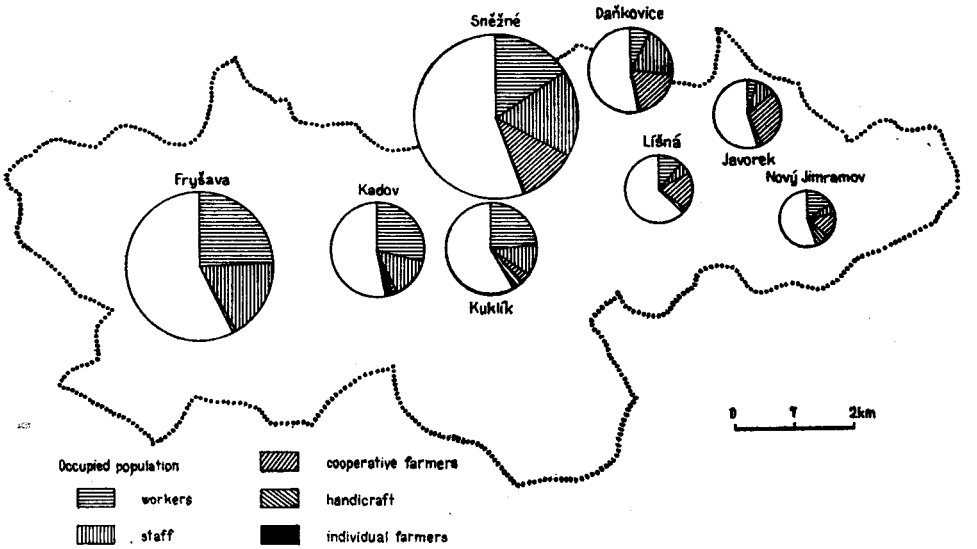



Fig.15 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN




forge furnace in Kuklík-village, loading hammered iron on the way back and carrying it to the iron stock in Vříšť-village. Similarly 15 serfs laboured at the Vříšť-village forge funace, and 11 serfs at Líšeň-village one". In no case it was a bucolic-arcadian landscape, most likely non pleasant place for living.

The ironworks needed more and more wood for charcoal burning, in 1814 it was 7,100 fathoms! and wood was imported to FRYDBA from adjoining forests. But

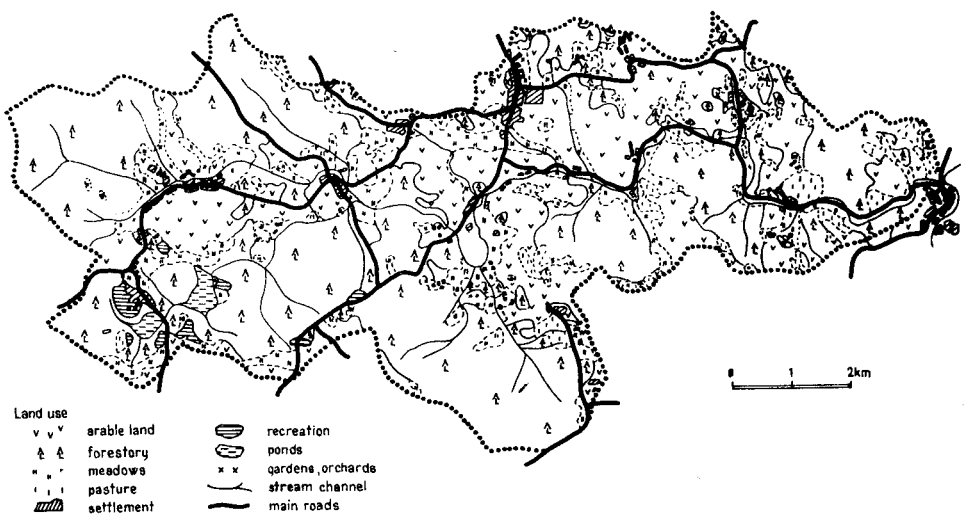
about the year 1850 the ironworks quickly decayed, it was caused by inability to market competition: former 16% Moravian iron production fell down at all. Iron was too expensive comparing it with the Vítkovice iron and steel. The latter was not produced at FRYDBA.

Iron production decline was accompanied by the 3rd spatial diffusion of innovations with relative growth of textile manufacture based on flax growing. Nevertheless, from 1850 population number started to decrease. Population outflow has been keeping on till now, as Table 1 is showing, drawn at Fig. 10, 11, 12, 13, 14 and 15.

After World War II the 4th spatial difusion innovation wave slowly started. Initial stage was an agrarian boom of individual farmers linked with land reform, though it was short. Industrialization and urbanization were more attractive processes like a gravitational force causing migration of manpower from FRYDBA. Agriculture was transformed into highly mechanized state or cooperative farms and so this was the middle stage strongly changing land use of FRYDBA. Now the 4th spatial diffusion wawe of innovations is in a final stage conduced to landscape stability, to adjust increase of recreational mainly out-door, function, nature conservation, agriculture and forestry development respecting social progress. The question of FRYDBAST is how to maintain relevant natural processes and how to organize socioeconomic development, among others at spatial man/land interaction adjustment.

For understanding FRYDBA we can offer the road network in Fig. 8, which is relatively stable. Slow development of permanent settlement and rapid growth of out-door recreational facilities is sketched in Fig. 9, while contemporary land use is portrayed in Fig. 16. The oldest detail land use report of cadastral survey from the year 1741 made by Křoupal is enclosed in Table 3, temporal cross-section is more complicated, the inquiry of it is coming on.

Fig. 16 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN



## FRYDBAST PROSPECT: SPATIAL ORGANIZATION OF NATURE CONSERVATION AND SOCIOECONOMIC DEVELOPMENT — SONCOSD

Geography is not only interested in landscape analysis, but is solving the task "how landscape should be". Therefore we offer spatial units denoted as "ecomicrochores" considered for FRYDBAST in the framework of SONCOSD. They are drawn in Fig. 17, here we give reasons for such spatial decisions or location/allocation strategy of landscape planning. It is an applied landscapelogy with prospect, prediction, recommendations, reclamation, adjustment proposition, organizational development in spatial context.

FRYDBAST: ecomicrochores

A Fryšávka forest
utility functions: forestry, recreation, water resources, rocks and wetlands conservation
uncertainties: low wood species diversity and impact of violent winds, imission impact fall on rocks, fragile soils and runoff, forest management, concentration of recreation

B Kadovský forest
the same as A, but with less important contemporary state of recreation, present impact of recreation is not so strong

C Fryšava—Kadov—Krátká settlement and agrarian landscape utility functions: settlement, cropland and meadows, road transport, water resources, cultural landscape heritage
uncertainties: soil erosion, settlement reconstruction and new off-style housing, meadows management of species diversity decrease, recreational management — facilities, transport, fiels blocking pushing plant and animal communities

D Sykovec-pond area
utility functions: water resources, forestry, recreation, wetland conservation
uncertainties: recreational abuse, permanent and recreational housing diffusion water quality, transport

E Medlov-pond area
the same as D, but with less permanent settlement

F Pasecký forest
utility functions: forestry, recreation, water resources, patches of cropland and meadows, rocks and wetland conservation
uncertainties: forest periphery recreational abuse, forestry, fragile ecosystems on rock walls, acid rains impact, housing diffusion

G Pohledecký forest
the same as F with difference in monosilviculture and almost monofunctional forestry

H Kuklík—Chobot—Odranec villages and hamlets area
utility functions: dispersed settlement, agriculture, recreation, water resources, cultural landscape heritage
uncertainties: fall or rapid growth of agriculture. land use retreival. soil

erosion, water quality, grassland management, housing conservation or reconstruction, recreational use

I Sněžné—Líšná area
utility functions: agriculture, recreation, settlement, water resources
uncertainties: soil erosion, environmental quality — water, waste deposition settlement development, housing, recreational capacity and facilities, verdure reduction, field blocking

J Daňkovice—Javorek area
the same as I, but less relevant recreational function, mainly agricultural landscape, villages with old-growing population

K Buchtův hill
utility function: forestry, medical care, water resources
uncertainties: acid rains impact, buffer zone

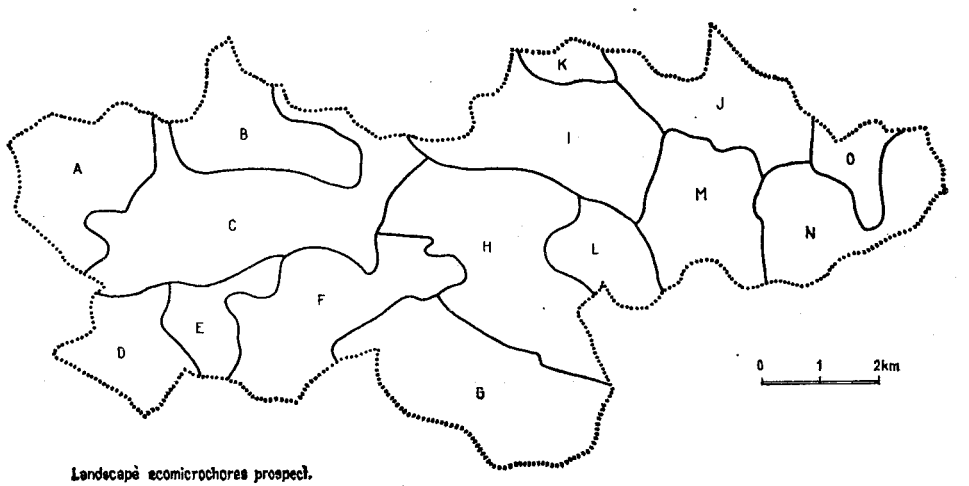
L Bohdalec forest
utility functions: forestry, water resources
uncertainties: maintainance of land use

M Rabuňka area
utility functions: forestry, agriculture: cropland and grassland, nature conservation, water resoures
uncertainties: soil erosion, settlement reconstruction, cropland development

N Jimramov area
utility functions: agriculture, forestry, housing, recreation, water resources
uncertainties: soil erosion, meadows management, water quality, population outflow, recreational management, transport

O Prosíčka ridge
utility functions: forestry, recreation, nature conservation
uncertainties: forest maintainance

Fig.17 FRYŠÁVKA DRAINAGE BASIN STRATEGY by GEWOBRUN



## CONCLUSION

Geographical inquiry carried out by GEWOBRUN in FRYDBA in the framework of FRYDBAST as formulated by SPOPVAN on subnational level of WOCOST has brought relevant data for nature conservation and socioeconomic development. Even not finished, present up-to-date 2nd approximation is portraying physical landscape, socioeconomic processes in cross-time section and man/land interaction.

But there are still some tasks we couldn't solve. We emphasize the integration, synthesis of physical, socioeconomic, regional, general and applied geography in considerations how to adjust the FRYDBA man/land interaction, how to reach optimal strategy and implementation for nature conservation and socioeconomic development. From that point of view GEWOBRUN will discuss FRYDBA ecomicrochores A—O which are the spatial units relevant for SONCOSD. Their field analysis, landscape survey and maybe delimitation changes and discussions with other RESTES will be a content of next research.

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*Table 1.* FRYDBA population, 1850—1980

| Settlements | 1850 | 1900 | 1930 | 1950 | 1961 | 1970 | 1980 |
|---|---|---|---|---|---|---|---|
| Tři Studně | 296 | 215 | 157 | 167 | 124 | 129 | 109 |
| Fryšť | 896 | 895 | 881 | 544 | 531 | 481 | 450 |
| Kadov | 428 | 344 | 362 | 214 | 170 | 162 | 157 |
| Krátká | 289 | 208 | 188 | 125 | 107 | 81 | 44 |
| Kuklík | 568 | 532 | 442 | 270 | 251 | 222 | 205 |
| Sněžné | 682 | 574 | 576 | 524 | 518 | 487 | 485 |
| Vříšť | 266 | 207 | 162 | 98 | 114 | 91 | 63 |
| Odranec | 392 | 307 | 256 | 147 | 130 | 108 | 86 |
| Daňkovice | 373 | 344 | 310 | 441 | 209 | 218 | 206 |
| Líšná | 534 | 310 | 277 | 161 | 153 | 140 | 119 |
| Javorek | 344 | 304 | 257 | 165 | 134 | 137 | 110 |
| Jimramov. Paseky | — | 142 | 102 | 66 | 74 | 42 | 18 |
| Nový Jimramov | 405 | 175 | 139 | 100 | 85 | 82 | 74 |
| Široké Pole | — | 64 | 41 | 24 | 21 | 14 | 4 |
| Total | 5,473 | 4,621 | 4,150 | 3,046 | 2,621 | 2,374 | 2,130 |

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*Table 2.* FRYDBA labour force, 1980

| Integrated settlement | Population | Manpower | Active | Workers | Staff | Cooper. farmers |
|---|---|---|---|---|---|---|
| Fryšava | 559 | 302 | 235 | 135 | 96 | — |
| Kadov | 224 | 121 | 91 | 51 | 32 | 3 |
| Kuklík | 205 | 90 | 84 | 48 | 22 | 6 |
| Sněžné | 687 | 351 | 303 | 107 | 118 | 76 |
| Daňkovice | 206 | 124 | 97 | 16 | 40 | 40 |
| Líšná | 119 | 64 | 44 | 14 | 7 | 21 |
| Javorek | 110 | 66 | 49 | 5 | 10 | 32 |
| Nový Jimramov | 96 | 51 | 43 | 15 | 6 | 14 |

*Table 3.* FRYDBA land use, 1741, in halves of acres, after Křoupal, in Svoboda J. F. 1948

| Settlement | Cropland | Meadows | Shrubs pastures | Gardens |
|---|---|---|---|---|
| Fryšava | 329 | 369 | 184 | |
| Kadov | 209 | 102 | | |
| Krátká | 149 | 85 | | |
| Kuklík | 995 | 387 | 66 | |
| Sněžné | 1,411 | 423 | 457 | |
| Vříšť | 156 | 54 | | |
| Odranec | 652 | 183 | 58 | |
| Daňkovice | 348 | 90 | | 5 |
| Líšná | 560 | 128 | 60 | |
| Javorek | 433 | 180 | | 1 |
| Nový Jimramov | 125 | | | |
| Total | 5,367 | 2,001 | 825 | 6 |