

The Sustainability of Agricultural Land Use

Abstract / Анотація

Сільське господарство як основна складова частина локальних агропродовольчих систем в модельних сільських радах не відзначається сталістю. Через низьку продуктивність, надмірну розорюваність земель, недосконалу структуру воно не здатне забезпечити в повній мірі ні потреби населення у продуктах харчування, ні нормально самовідтворюватися. До того ж, воно створює велике навантаження на оточуючі екосистеми. Основними чинниками недостатньої сталості сільського господарства є загальноекономічні. Для підвищення рівня сталості сільського господарства в модельних сільських радах необхідно підвищити рівень життя місцевих жителів, удосконалити структуру сільськогосподарського виробництва, скоротити посівні площі сільськогосподарських культур та поголів'я тварин, підвищивши їхню продуктивність.

Сільськогосподарський потенціал ландшафту відображають за допомогою кількох показників:

- ▷ продуктивності ґрунту для трав та основних категорій просапних культур, таких як картопля, овочі та зерно;

- ▷ ризику розвитку водної ерозії ґрунту;
- ▷ сумарної площі сільськогосподарських угідь;
- ▷ транспортної доступності сільськогосподарських земель.

Комплексний аналіз у середовищі ГІС даних про продуктивність ґрунту, ухили поверхні, сільськогосподарське землекористування та мережу доріг забезпечив визначення цих показників.

Дослідження встановили, що карпатські сільради мають відносно високий потенціал продуктивності трав, який обмежує високий ризик водної ерозії ґрунту та погана доступність ділянок. Подільські сільради відзначаються високим потенціалом вирощування просапних культур і трав та незначними обмеженнями, зумовленими ризиком водної ерозії. Передкарпатські сільради характеризуються відносно скромним потенціалом ґрунту як для ріллі, так і луків, але й не мають серйозних інших обмежень.

Introduction

O. Bitter and M. Bomba

According to the definition of the UNO world committee of development and environment (Brundtland committee), the term “*sustainable development*” stands for the pursuit of a development pattern which conserves the limited natural resources for the following generations, too. Amongst the

Ukrainian interpretations of the term “sustainable development”, the following has to be pointed out: development in the field of an economic (ecological) environmental unit not causing any irreversible changes in nature and bringing about no menace to the permanent existence of man


(DROBNOKHOD 2001). It is about protecting man's prosperity and *nature conservation*. When a post-industrial society (information society) becomes aware of the limitations of the ecological imperative within its economic growth, it will show characteristics of a society of sustainable, economically safe development. In contrast to an industrial society, the paradigm of such a society is based on organic (no mechanical) trinitarian organisation of economic, social and ecological points; the latter being of major importance. The philosophy of such societies' existence is traced back to the protection of maximum socio-economic results against the minimal exploitation of resources.

The sustainability of socio-economic systems is protected by the sustainability of their subsystems. The sustainability of the agrarian and the food subsystem, including *agriculture*, can be defined as a system's ability of ensuring its own growth against the compliance with certain proportions of its internal development and the parity with the development of such systems interacting with it like the national and the international economic, ecological and social system. Within the examination of sustainability of the agrarian and the food system and its subsystems, their investigation on different hierarchic spatial scales is the main focus, particularly on the nationwide level, the oblast and the local level.

Amongst the factors which have an effect on the sustainability of the agrarian and the food system as well as its subsystems, particularly agriculture, one generally detects economic factors (which are exogenous towards it), but also endogenous ones which reflect the internal specific function of that system. As for general economic factors with regard to their effect on the sustainability of the agrarian and the food system, including agriculture, the following are considered to be the most important ones (ANONYMOUS 2001):

- ▷ the amount of the investment resources;
- ▷ the state of *inflation*;
- ▷ the proportion of the price of goods produced by the system and the exploited resources;
- ▷ the people's expenses for food;
- ▷ the amount of the state's food reserves.

From our point of view, the insufficient sustainability of local agrarian and food systems in the *model communities* is reflected through the following characteristics:

- ▷ The low state of employment amongst local inhabitants, the official as well as the veiled *unemployment rate*, leading to a low ability to pay. Peasants are thereby forced to stick to *subsistence farming* in order to supply themselves with food.
- ▷ Primitive technology in the field of plant cultivation and *animal husbandry*, forcing peasant families to work on areas of *arable land* larger than what is normal for their supply. This leads to a highly negative effect of agriculture on the ecosystems, particularly through the tilling of big parts of area. In addition, primitive technology does not guarantee solid yield, and the supply with foodstuffs largely depends on the weather conditions ( *Effects of Transformation Processes in Crop Cultivation*).
- ▷ The irrational structure of areas of cultivable land and of the stock of working animals as a consequence of the discrepancy between the amount of food needed by peasant families and the structure of production in family farms. The structure of land in the field of plant cultivation shows a *potato* proportion way too high; the stock of *cows* is predominant in the field of *animal husbandry*. Therefore, the villagers make use of a surplus of potatoes, *milk* and *milk products*. Irrationally, these products are fed to animals to a large extent, e.g. milk for *pigs* and *chicken* feeding. At the same time, the consumption of other foodstuffs of the same importance gets worse.
- ▷ The low prosperity of the local populations forces them to look for ways of making a living outside *agriculture*. Through illegal *tree-fellings* and the extensive use of *fruits* of the *forest* (*berries*, *mushrooms*, precious *rampant plants*), their stocks go down, and the ecosystems lose their equilibrium.
- ▷ The agricultural use of *floodplains*, steep slopes and *clearings* brings about a particular damage to the ecosystems. However, the local population cannot give up these forms of usage, because the productivity on other areas is just too low.

- ▷ The initiation of *agricultural cooperation* could bring about improvement both in structure and form of *agricultural land use*. The foundation of cooperatives for purchase and disposition and a renaissance of consumer cooperatives would create an improved structure of land and animal stocks to a certain extent. For example, in order to supply the peasants with milk, it is not necessary that each family keeps a dairy cow. Neither must each family herd this cow separately in pastures. In many villages of the region, this way of herding cattle is already being organised. However, there are no cooperatives of peasants yet (☐ *Recommendations for the Development of Animal Husbandry and Pasture Management in the Model Community Verkhniy Luzhok: Economical and Socioeconomical Aspects*).
- ▷ The low state of legal and environmental awareness leads to a predatory usage of the surrounding ecosystems, ecologic micro disasters, and decrease of crop yield and *pollution* of the areas through *waste* (☐ *Chemical Pollution and Environmental Standards*).
- ▷ The deterioration of the ecologic situation because of the lack of financial resources for environmental purposes.
- ▷ *Soil degradation* as a consequence of natural factors as well as of inappropriate agronomic solutions (☐ *Soil Erosion: Possibilities for Soil Protection*).

Thus, the agrarian and the food system, including agriculture, cannot be considered sustainable in the model communities. The inhabitants are not sufficiently and steadily provided with the majority of employers' contributions and goods, especially money and non-cash *income*, institutions of the *social infrastructure*. Agriculture as the major branch of production shows no high productivity and stability; it is not capable of providing the peasants with all the necessary food and it damages the *environment*. The ecosystems in the *model communities* are neither considered sustainable because of the negative effects of human economic activities.

The agrarian and the food systems have a certain potential of adapting. There are requirements

for economic self-control and adaption to the shifting environmental conditions, including loadings amongst the market-economic conditions. The *sustainable development* of the agrarian and the food system, including agriculture, means to realise the potential adaptability of the system to a maximum extent and to increase it by means of promotions carried out by the state. These ways of promotion include (ANONYMOUS 2001):

- ▷ to create conditions for a sustainable solvent demand of the population;
- ▷ to accelerate the land reform which is aimed at the market;
- ▷ to renew and modernise the resource potential of all the system's elements;
- ▷ to change organisation and structure within the system;
- ▷ to develop activities in foreign trade.

In order to protect the *sustainable development* of the agrarian and the food systems, including *agriculture*, within the model communities, the following measures are of priority:

- ▷ the implementation of governmental decisions in order to create jobs, especially in non-agricultural companies for the general purpose of increasing prosperity amongst the population;
- ▷ the intensification of the land reform, with particular regard to the enlargement of agricultural farms and to the motivation of organic cultivation;
- ▷ the development of *tourism*, especially in the area of the *Carpathian mountains* and the *Pre-carpathians* (☐ *The Potential of Tourism in Western Ukraine*);
- ▷ the development and implementation of regional and local agendas for *soil protection* in degraded and less productive areas; the implementation of integrative land use;
- ▷ the development of the social infrastructure on the countryside, environmental education of the rural population;
- ▷ the development of several forms of cooperation in all model communities.

The foundation of peasant *cooperatives*, particularly in the model community of *Verkhniy Luzhok*, and the use of a mountain *pasture* in the model community of *Volosyanka* can be considered one of the concrete ideas of the participants

in order to increase the sustainability for the development of model communities, their agrarian and food systems, including agriculture, which can be realised in near future.

Agricultural potential of model communities

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Introduction

Since sustainable agriculture should maintain a certain balance between environmental sensitivity and economic efficiency, it is important to estimate how much *nature conservation* activities can impact agricultural production in a landscape. For this reason, and for the physical planning process in general, it is important to have geospatially-explicit information about the agri-

cultural potential of an area. Thus, *GIS* facilities are used to determine agricultural potential of all *model communities*. The information helps to estimate maximal possible sustainable production of the main cultures under the present land use situation as well as under the conditions of an improved land use structure.

Theoretical backgrounds

The notion of a landscape (region) economic potential was coined by NEEF (1966) and developed by his followers (BASTIAN 2000; HAASE et al. 1991; MANSFELD 1983). It designates the ability of an area to satisfy certain existing or possible economic needs of the society. Different partial economic potentials can be distinguished: *recreation*, *water use*, construction, etc. (NEEF 1966). In this study, an agricultural potential is interpreted as the ability of an actual landscape to support sustainable agricultural production as the result of application of the best existing techniques and practices. Thus, the two main groups of factors determine the agricultural potential:

- ▷ the properties of the actual landscape;
- ▷ the level of actual development of agricultural techniques and practices.

Following the idea of HAASE et al. (1991), an actual (cultural) landscape is interpreted as a geographical superimposition of natural features of an area with the physical features of human origin, which are represented by actual land use/land

cover structure. The set of natural features in the actual landscape is associated with a natural area (HAASE et al. 1991), or morphogenic *geoecosystem*, in which landforms control the spatial differentiation of the structure and processes (□ *Natural Geoecosystems of the Upper Dnister Basin*). In particular, landforms control the spatial pattern of the *soil* (GERRARD 1981; GESSLER et al. 2000), whose natural *fertility* is one of the principal components of the *agricultural potential*. Landforms also indicate the soil water *erosion risk*, which is the main natural limiting factor of agricultural development in humid climates (BRYAN 1979).

Actual land use / land cover indicates the extent of agricultural areas. The study is concentrated on the two basic agricultural land use types – on *grassland* and on *arable land* located outside the residential areas. It is assumed that the general portion of these land uses should not be increased in a sustainable landscape. Geographical proximity of the agricultural areas to the main roads is another landscape factor determining agricultural potential. It is especially important for *mountain*

regions with prime grasslands located far from the settlements on mountain ridge tops.

It is assumed that in a sustainable landscape quasi-organic agricultural techniques may be applied, which are based on the balanced application of biological and agrotechnical measures together with the *integrated plant protection* that envisages limited use of *mineral fertilisers* and *pesticides* (BOMBA 2004). Thus, the *agricultural potential* is revealed by a set of complementary indices that present

- ▷ maximal sustainable yields and overall production of grass and the main cultures such as e.g., *potato, wheat*;
- ▷ soil *erosion* risk;
- ▷ proximity (accessibility) of the agricultural plots.

The possible yields of the main cultures as a result of application of intensive techniques based on extensive use of chemicals are also given in this study for a comparison.

Material and methods

ArcGIS software was used to process geographical data. The information about the *soil productivity* was derived from the soil digital geo-datasets available for each model community. The soil geo-data have the accuracy of a 1 : 10,000 map. The attributes include information about the so-called “soil appraisal score” (quality), which reflects officially assessed *soil quality*. The “appraisal score” is a number from 0 to 100 and is established based on the integrated regional comparative evaluation of the soil productivity, which includes several biophysical factors (ANONYMOUS 1993). Thus, the “soil appraisal score” correlates with the *soil fertility* and was used to group the soil units into four categories – of high, middle, and low productivity, as well as non-usable. The grouping was separately done for *grassland* and *arable land*, and for the three different regions of the *Upper Dnister Basin* – for *Carpathians*, *Precarpathians*, and *Podolia* (Podillia) (☞ *Natural Geoeosystems of the Upper Dnister Basin*).

Tab. 1: Soil erosion risk categories according to the average surface slope (DOBRYAK et al. 2001)

Soil erosion risk	Surface slope [degrees]	
	Arable land	Grassland
Low	0–3	0–5
Fair	3–5	5–12
High	5–7	12–20
Marginal/Non-usable	>7	>20

For each soil productivity category, maximal sustainable yields (in *metric hundredweights* per ha) were estimated for the grassland. For the arable land, the sustainable yields were estimated for the main categories of regional cultivated cultures (e.g., potato, *vegetables*, *grain*) using data from previous regional studies (BOMBA 2004; PATYKA & TARARIKO 2002). For comparison, the probable yields were also estimated for the conditions of *intensive farming*.

It should be mentioned that “soil appraisal score” does not consider geomorphic properties of a soil unit or the soil water erosion risk. It considers, however, actual soil erosion. Therefore, the polygons of the soil units reasonably well coincide with the landforms. They are suitable to delineate relatively homogeneous areas with the same topographic locations and surface gradients – pedomorphic units. The polygons of the pedomorphic units were overlaid with the slope surfaces produced from digital elevation models (DEM – ☞ *The Dnister GIS: Design, Applications and Proposal in regard to its further Implementation and Development*) using a GIS zonal function (e.g., ESRI 2002). As a result, average slope was calculated for each pedomorphic polygon. The average slope data were taken to estimate the soil water erosion risk in each polygon. Published recommendations (DOBRYAK et al. 2001) were used to group the pedomorphic polygons according to the average slope into four categories – with low, middle, and high soil *erosion* risk, as well as marginal/non-usable. The grouping was separately

done for *grassland* and *arable land* (Tab. 1). As a result, suitability of each pedomorph polygon was estimated for grassland and arable land based on the *soil fertility* and water erosion risk.

The actual extents of grassland and arable land were derived from the digital 1:10,000 topographic maps. The borders of the agricultural land cover were also actualised by the special field surveys (subprojects 1.2 and 2.2). The overlay of the land cover geo-dataset with the geo-dataset of pedomorph units, and the subsequent filtering of the resulting geo-dataset, allows delineation of actual agricultural landscape units that are characterised by a certain combination of actual land use (grassland or arable land), soil productivity, and soil water erosion risk.

Then, proximity of each agricultural landscape unit to the nearest road was calculated using a

cost-distance GIS function. The function considers the distance to the road as well as the surface impedance to the transport movement (e.g. ESRI, 2002). The impedance was calculated as a geometrical relation with factor 2 for the five slope categories: 0–3, 3–6, 6–12, 12–25, >25 degrees. For example, the slope category of 0–3 degrees has the traffic impedance factor 1, the slope category of 3–6 degrees has the factor 2, while the slope category of 6–12 degrees has the factor 4, and so on. The cost-distance surface was built using the geo-datasets of the roads and of the surface slope (derived from the DEM). Finally, the cost-distance surface was overlaid with the geo-dataset of the landscape units using a zonal function, and the average proximity to the road (in *conditional metres*) was calculated for each polygon (agricultural landscape unit).

Results and discussion

The final polygon geo-dataset for each model community contains attributes on:

- ▷ the category of the soil water erosion risk;
- ▷ the soil productivity expressed in the maximal sustainable yield of grass and some main categories of cultivated crops;
- ▷ the actual land use (grassland or arable land);
- ▷ the average proximity of the unit to the nearest road.

The geo-datasets afford integrated spatial analysing of the present agricultural potential of the communities as well as tracing its changes depending on the different physical planning solutions. They also afford production of compatible thematic maps using the attribute items listed above.

The grouping of the soil units according to the “soil appraisal score” into the suitability categories for grassland are shown in the Tab. 2, and for arable land in the Tab. 3. The yields given in the tables have tentative character – they are estimated for rather wide categories of cultures and were not verified with the field data from the particular communities. Nevertheless, these estimates are sufficient for the comparative study of the agricultural potential. The grass yields in

the mountain communities (MC 1a, 1b) are significantly higher than in the communities of the plains (Tab. 1). The arable land outputs, however, are higher in the plains, especially in the *Podillia* communities (Tab. 2). The landscape of the *Precarpathians* (MC 2) supports neither productive grassland, nor arable land – grass yields are significantly lower here than in the mountains, while yields from the arable land are only slightly higher than in the mountains and significantly lower than on the *Podolian Plate*.

The analysis of the soil erosion risk reveals that the communities of the Precarpathians are least endangered owing to a relatively flat terrain (Tab. 4). Obviously, the mountain communities have limited potential, especially for arable land, because of the significant surface slope. The community of *Verkhniy Luzhok* (1a) has more favourable conditions, in comparison with the community of *Volosianka* (1b), because of the relatively wide *Dnister* valley bottom, which is intensively used for *agriculture*. It should be mentioned that these estimations are rather tentative, because they do not consider variations in the slope length and profile as well as different precipitation regimes in the mountains and on the plains.

While estimating the production potential of grassland, it was assumed that the whole agricultural area (including arable land) can be used as *meadows* or *pastures*, excluding, however, soils of low and middle productivity on the slopes

above 20 degrees. The mountain communities (1a: Fig. 1, 1b) have the highest potential of grass production owing to significant areas suitable for *grassland* as well as to rather high *soil productivity* for the grass. This especially refers to the

Tab. 2: Soil suitability categories for *grassland*

region	soil appraisal score (quality)	productivity category	maximal sustainable yields [hundredweights/ha]	maximal intensive technique yields [hundredweights/ha]
Carpathians (MC 1a, 1b)	1–4	low	165	170
	5–7	middle	170	185
	>7	high	180	200
Precarpathians (MC 2)	1–4	low	80	100
	5–15	middle	100	120
	>15	high	115	170
Podolian Plate (MC 3)	1–10	low	90	110
	11–28	middle	110	130
	>28	high	160	180

Tab. 3: Soil suitability categories for *arable land*

region	soil appraisal score (quality)	productivity category	maximal yields [hundredweights/ha]					
			potato		vegetables		grain	
			sustainable	intensive	sustainable	intensive	sustainable	intensive
Carpathians (MC 1a, 1b)	<10	non usable	–	–	–	–	–	–
	10–14	low	130	180	160	240	29	33
	15–19	middle	150	200	180	250	32	35
	>19	high	165	210	215	270	34	37
Precarpathians (MC 2)	<10	non usable	–	–	–	–	–	–
	10–14	low	130	170	160	240	29	33
	15–22	middle	140	190	180	250	32	35
	>22	high	170	220	190	270	34	37
Podolian Plate (MC 3)	<10	non usable	–	–	–	–	–	–
	10–22	low	180	210	270	285	33	38
	23–38	middle	200	230	290	300	36	41
	>38	high	220	250	300	320	39	44

Tab. 4: Distribution of agricultural land according to the soil erosion risk

MC	total agricultural area [ha]	areas of erosion risk (slope) categories for grassland [ha]				areas of erosion risk (slope) categories for arable land [ha]			
		low (0–5°)	middle (5–12°)	high (12–20°)	marginal (>20°)	low (0–3°)	middle (3–5°)	high (5–7°)	marginal (>7°)
1a Verkhniy Luzhok	1,021	213	259	457	92	211	2	43	765
1b Volosianka	2,171	49	884	1,066	172	6	43	50	2,072
2 Dubliany	1,020	1,020	0	0	0	969	51	0	0
2 Kolodrubyy	1,063	1,063	0	0	0	1,063	0	0	0
3 Horyhliady	531	492	31	8	0	483	9	24	15
3 Olesha	991	991	0	0	0	887	104	0	0

Tab. 5: Potential production of *grassland*

MC	total area [ha]	maximal grassland area [ha]	maximal sustainable production [hundredweights]	maximal intensive production [hundredweights]
1a Verkhniy Luzhok	3,095	939	195,930	213,940
1b Volosianka	6,825	2,108	377,151	417,205
2 Dubliany	2,560	1,020	109,226	150,243
2 Kolodrubyy	1,736	1,063	110,535	142,016
3 Horyhliady	846	531	76,113	86,719
3 Olesha	1,150	991	142,987	162,813

Tab. 6: Potential production of *arable land*

MC	total area [ha]	maximal arable land area [ha]	yields [hundredweights]					
			potato		vegetables		grain	
			sustainable	intensive	sustainable	intensive	sustainable	intensive
1a Verkhniy Luzhok	3,095	256	40,985	52,650	52,975	67,830	8,516	9,307
1b Volosianka	6,825	99	13,479	17,778	17,053	23,089	2,871	3,175
2 Dubliany	2,560	1,020	151,898	201,346	183,161	258,097	32,689	35,760
2 Kolodrubyy	1,736	937	129,379	171,590	160,366	231,579	28,793	32,067
3 Horyhliady	846	516	106,419	121,907	150,365	158,474	19,064	21,639
3 Olesha	1,150	925	185,620	213,365	266,836	278,906	33,390	38,015

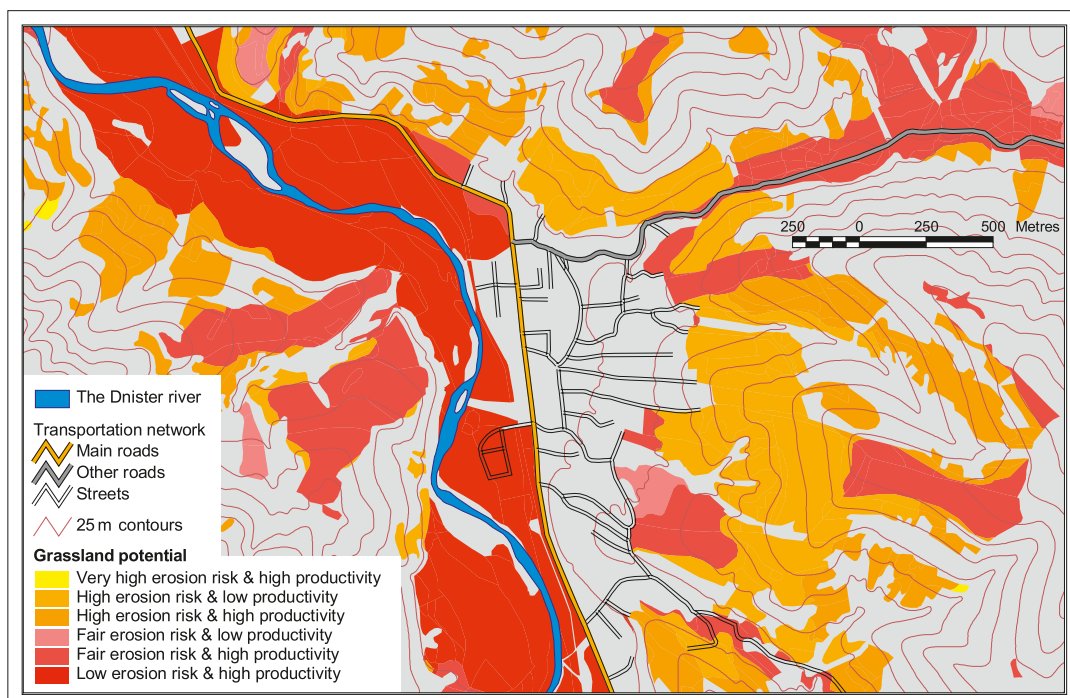


Fig.1: Verkhniy Luzhok (fragment). Geo-spatial distribution of the *grassland potential* in terms of soil *erosion risk* and *soil productivity*

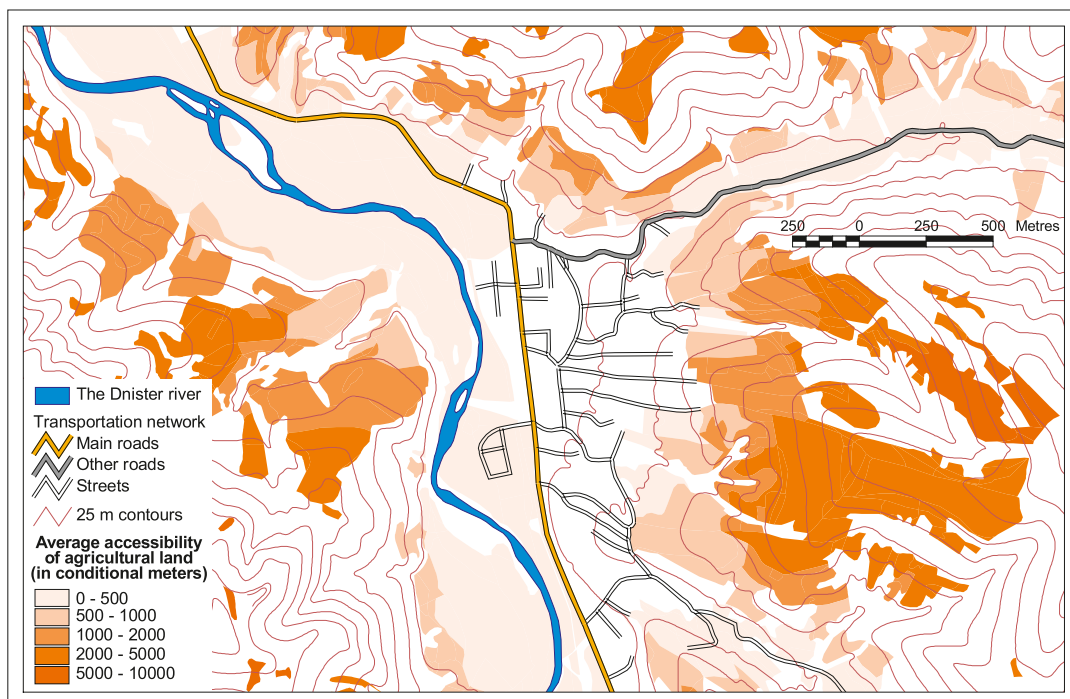


Fig.2: Verkhniy Luzhok (fragment). Distribution of agricultural potential in terms of accessibility

community of *Volosianka*. The least potential has the community of *Horyhliady* on the *Podolian Plate*, because of the small total size of the agricultural area (Tab. 5).

The highest potential for the *arable land* production has the community of *Olesha* on the Podolian Upland. As expected, the mountain communities have the lowest potential owing to the soil *erosion* risk limitations and unsuitable soil/climate conditions (Tab. 6).

Spatial accessibility of the agricultural land is another factor significantly influencing the agri-

cultural potential. The access to the fields in the plain communities is rather simple – the distance from the nearest road is mainly within 500–2,000 *conditional metres* (Tab. 7). In the mountain communities, however, the significant portion of the agricultural land (grassland) is located at the distance of more than 2,000 *conditional metres* from the nearest road (Fig. 2). For example, the community of *Volosianka* (1b) possesses grassland on the surrounding ridge tops.

Conclusions

The estimated indices give reasons to judge the capability of the model communities to support sustainable agricultural production. Explicit spatial referencing of these indices by means of respective geo-datasets affords physical planners to prepare the landscape visions and to operatively imitate the possible changes in the capacities of the agricultural production depending on different planning scenarios. In this respect, the notion of the reference (operative) geo-spatial unit as a combination of the quasi-homogeneous soil/landform properties, land use type, and economic location (proximity) turned out to be an efficient concept.

The study reveals that the *Carpathian* communities have relatively high potential for grass

production, which is limited by the high soil erosion risk and bad accessibility of the plots. The *Podolian* communities have high potential for cultivation and grass production, and insignificant restrictions due to soil erosion risk. The *Pre-carpathian* communities have rather modest production potential, both of grassland and arable land, but also possess no major limitations.

Further steps in this study may include verification of the obtained indices with the field material, namely concerning real yields of the main cultures and grass. The indices may be compared with the population numbers to estimate the possible production per capita and thus the rates of agricultural self-sufficiency of the communities.

Legal and economic aspects of the foundation of agricultural cooperatives

O. Bitter and M. Bomba

At present there is no motivation for the foundation of *cooperatives* in Ukrainian agriculture. This is mainly caused by:

- ▷ the unfavourable financial situation of the small private owner on the countryside who is to become the most important member of a cooperative;
- ▷ the lack of financial resources for the cooperation;
- ▷ a subjective factor – the fear of new „collectivisation“;

- ▷ lacking or at least non-sufficient state promotion for *agricultural cooperations*;
- ▷ the lack of legal bases for the development of agricultural cooperation.

The development of a system of *service cooperatives* is still in its initial period in the *Ukraine*. Since the 1997 enactment of the law “About agricultural cooperation” (with its supplement of 2000), agricultural enterprises are allowed to found the following service cooperatives:

- ▷ cooperatives handling the treatment and sale of products from *crop cultivation, animal husbandry, forestry* and *fishing*;
- ▷ sales cooperatives handling the conditioning, storage, advance sale-treatment and sale, as well as marketing ;
- ▷ delivery cooperatives handling purchase and delivery of all the production facilities and material resources necessary for agricultural production and product treatment, as well as the production of raw materials and materials and their delivery to agricultural farms (members of the cooperative);
- ▷ service-technological cooperatives offering services like technology, transport, land improvement, repairing, construction works to its members, dealing with ecologically-fabricating tasks, operating veterinary services and animal husbandry, offering scientific and economic consultation, as well as other services;
- ▷ multifunctional cooperatives, dealing with several of the tasks mentioned for their own members.

According to the law about agricultural cooperation, an agricultural cooperative has to consist of at least 3 members. The process of founding a cooperative consists of two basic stages:

- ▷ the organisational stage leading to the foundation;
- ▷ the state registration of the cooperative.

People who want to found a cooperative should learn about the main legislation for cooperatives as well as about other regulations arranging their activities in order to guarantee the compliance with all regulations and to avoid possible mistakes.

When the purpose of founding a cooperative is clear to everyone, the initiators have to start preparing all the legal documents which are necessary for registration and further activities. All documents can be split up into two groups:

- ▷ foundation documents which are necessary for the registration;
- ▷ documents which are necessary for further activities after the registration (applications for entry, membership cards, authorisations for seals and stamps, account opening).

A company requires funds and tangible assets for:

- ▷ covering its costs for organisation;
- ▷ capital assets;
- ▷ savings;
- ▷ salaries.

Already during the organisational stage the *co-operative* needs funds, e.g., for paying the services of legal advisors and economists working on the development of the technical-economic basis and the draft of the foundation documents.

The larger part of the funds (subsequently to the foundation) is required for purchasing or renting several objects – accommodation, technology, investments (capital assets). Not every cooperative can afford large expenses for purchasing production facilities during the initial period. During this period, it makes more sense to rent them.

For paying these and other costs, there are two available kinds of funds – funds of the members and the cooperative and raising of loans.

The major sources for a cooperative's own funds are:

- ▷ the members' investments (cash and non-cash deposits);
- ▷ *income* from the cooperative's own activities (sale of products, services, other activities);
- ▷ interest;
- ▷ income from selling stocks and shares.

Bank loans are the most important and, basically, the only source of borrowed funds of a cooperative. The deposits of its members are an important source of a cooperative's assets. Such deposits of the respective members dictate to a large degree the specialisation of the cooperative's property.

A member of a cooperative must contribute part of his obligatory deposit even before the state registration of the cooperative; this part is also called the entry contribution. The amount of this entry contribution (as well as of the whole deposit) is fixed by the general meeting and fixed through the ordinance.

There are two ways of depositing:

- ▷ a relatively high deposit is fixed but the respective member is allowed to pay it by installments within a certain amount of time;
- ▷ a low deposit is fixed and the members are allowed to have several deposits. Irrespective of the number of their deposits, a member has only one vote at the general meeting.

According to their economic mechanisms and their relations to members, all legally accepted kinds of service cooperatives are both those making for shared opening of domestic and foreign markets together with single agricultural producers, or those which have been founded for the purpose of shared usage of production facilities purchased together. They can, however, combine these two functions.

The cooperatives for *milk*-processing which spread from the Oblast Lviv to other regions, developed to reduce the negotiating difficulties in selling which those families of peasants face who are keeping *cattle*: unfavourable low prices for milk, delayed payments from *dairies*, but mostly no possibilities for selling milk.

The system of milk-processing which used to work through *kolkhozes*, village councils or consumption cooperatives does not work anymore; yet, there is no sense for dairies to take milk from each single cow-holder.

Although the milk production through peasant families accounts for approx. 70 % of the total Ukrainian milk production, these families only deliver about 10 % of their produced milk to manufacturing companies (☞ *Recommendations for the Development of Animal Husbandry and Pasture Management in the Model Community Verkhniy Luzhok: Economical and Socioeconomic Aspects*). This is one of the reasons why dairies are only used to capacities of 10 to 30 % and why the majority of these companies are vacant without raw materials during the winter.

The milk cooperatives differ from the other ones in only one point: their members are merely natural persons: representatives of peasant families. In addition, they include a large number of members (100 people and more, as a rule).

The preparations in order to found a milk-cooperative face many difficulties and take a lot of time, since the peasants have to deal with an organised structure for the first time. The process of forming an association is hard for them. But whenever a cooperative is founded in close cooperation with the village council which used to handle the processing of cow-milk, the problems are likely to be solved quicker.

The main matter of the activity of present *milk cooperatives* is processing, securing the provisional storage of milk and the search for advantageous distribution channels with the aim to increase the retail price and the production of goods for the cooperative's members.

In addition to the processing and the sale of milk, the cooperatives provide additional services for their members. Some own centres of artificial cow-insemination. Such work is carried out together with specialised facilities, having experts and state promotion at their disposal and being capable of providing the necessary instruments, training and consultation. The cooperatives hire trained vets or they sign a contract with a veterinary service.

There are cooperatives which deliver several materials necessary for milk production to their members: e.g. mixed fodder, the seeds of fodder plants, *mineral fertiliser*, *plant protective agents*, tools. In some cases, the cooperatives buy the necessary technology and provide their members with services of mechanisation, e.g. soil preparation, mowing, transport of the fodder plants harvested, *pasture* melioration, to enable them to produce fodder on their own.

More and more, the cooperatives take on the pasturing of the *cow-stocks* for their members, since an organised way of pasturing is only possible on the basis of a scientifically reasonable usage system including e.g. cultivation and maintenance of the pastures, regulation of the distribution of *cattle*.

According to generally accepted procedures, the capital assets of a milk cooperative are formed through investments of its members, according to the amount of milk sold by the cooperative. What

is so special about that is the fact that, at the moment, milk cooperatives are founded on the basis of the assets which are already available within the community and which either belong to the village council or to a collective farm.

For instance, a cooperative is given a milking plant, a cooling plant, agricultural technology, a motor truck etc., which its members had been given as capital interests after the privatisation. The village council can give its assets to a cooperative either for free or in return for payment of rent. Even the *dairy* which purchases milk from a cooperative can rent the equipment necessary for milk-processing to it.

The milk price is fixed in a contract between the cooperative and the dairy (or another customer). The price for the service, which is subtracted from the milk-retail price, includes all the expenses in connection with processing and sale. On average, such a service costs between 0.1 and 0.6 UAH (0.02–0.1 €) per litre of milk. Prices

for other services are fixed according to the same principle.

At the moment, the milk cooperatives only deal with the processing and the delivery of milk for the purpose of manufacturing. Since the better part of the added value arises during the process of manufacturing of milk and remains in the dairy, the profitability of milk for peasants is rather low. By arranging the processing, such cooperatives are much more useful to the dairies than they are to the peasants (members of the cooperative). In the end, their organisation on a local level can lead to being disappointed with the idea of a cooperation of peasants. In order to avoid that, the milk cooperatives are to devolve to the next higher level, namely to milk manufacturing or to the sale of unprocessed raw milk to the end user. This will obviously happen by founding cooperatives of the second level (milk-manufacturing Rayon cooperatives).

The foundation of credit cooperatives

Rural *credit cooperatives* are special kinds of *service cooperatives*. Cooperative credit institutes represent a form of shared financing (of collective self-financing) of a group of economic units which are mostly similar in their activities. These cooperative credit institutes were distributed throughout the countryside, particularly in the field of *agriculture*.

That is because the service for rural customers is not advantageous for commercial banks due to special features of agricultural production (seasonality, high capital intensity, slow capital turnover, partly dead capital in the form of estates etc.), spatial diffusion of agricultural farms, their low liquidity, and the large distances from cities. In addition to that, high interest rates of private credit institutes are unacceptable for agricultural producers.

Peasants find a way out by founding *credit cooperatives*, benevolent funds, savings and credit associations, and other credit structures providing similar services to banks. These structures provide accounts, take all sorts of deposits, allow

loans, invest free funds in stocks, provide broker and notary services etc.

The credit cooperatives (e.g., societies, associations, benevolent funds) are designed as non-profit structures and they are free from tax on yields. They are founded for self-service of their members, so that the members can enjoy the benefits of a credit institute on a non-commercial basis. If a credit cooperative achieves profit from a member or from a customer who is not a member of the cooperative, these profits are shared between the members depending on their deposits, according to a decision of the general meeting. Such a form of cooperation like credit cooperatives can go through further development in Ukraine's agrarian economy. It is special because only natural persons can appear as founders.

The main aim of a credit cooperative is financial and social protection of its members by deposits of personal savings, in order to allow each other loans. The legal basis for the foundation and the activities of credit cooperatives are the "Provisional regulation of credit cooperatives in

Ukraine”, which was approved by order of the President (Sept. 20, 1993) as well as the prototype constitution of a credit cooperative which was approved by the management of Ukraine’s National Bank (Feb. 2, 1994). In September 1999, the law “About credit cooperatives” was accepted at first reading by the *Verkhovna Rada of Ukraine*.

A cooperative’s funds, consisting of their members’ various deposits, are used for awarding loans to the members. This is the main function of credit cooperatives. The loans can be awarded for various purposes and on various conditions.

There are three major kinds of deposits in a credit cooperative: the entry fee, founder deposits, and saving deposits. The entry fee is an obligatory deposit of each member and non repayable. The cooperative owns this fee and deposits the whole sum or a part of it as a reserve or uses it for other pools. This amount cannot be paid back when a member leaves the cooperative. There is no interest paid on entry fees.

The founder deposits are repayable. They can be of two kinds: obligatory and additional. The obligatory founder deposit is a requirement of the

cooperative. Additional founder deposits can be made at the request of the members. The founder deposits, however, form the credit funds which are used in order to allow loans to the cooperative members.

The amount of the obligatory founder deposit is fixed in the constitution or by notification of the board of management. The obligatory founder deposit must be either paid in one sum when a new member enters the cooperative or by instalments. The founder deposit is only paid back when the respective member leaves the cooperative.

Interest on founder deposits is not reported in advance, but they are specified on a regular basis or at the end of each year, starting from the results during the period under review.

Unlimited, limited and specific saving deposits are not obligatory repayable and they are stored for solicited redemption. They are the property of the members and they are at the cooperative’s disposal on certain conditions, indefinitely or for a certain time, at fixed interest as a rule. The saving deposits are added to the credit funds which are used to allow loans.

Recommendation for the usage of the high mountain area (*polonyna*) pasture in Volosianka

O. Bitter and M. Bomba

The *polonyna pasture* in the high mountain region (Fig. 3) of the village of *Volosianka* was used up to the early 1990s as grazing area of *cattle* and *sheep* of the local Sovchosc. With regard to the nature-conservational value of this area and the socio-economic situation in the neighbouring villages, it is recommended to take it again under pasture.

Implementation of all-year pastures. From the economical and ecological point of view the area is suited well for the implementation of all-year-grazing systems with free roaming half-wild herbivores (*horses*, *cattle*, and *sheep*). In addition the implementation of the pasture system could reduce the insufficient supply of the local population with *meat* and *meat products*.

Many elderly people who are experienced in the keeping of cattle and machining products of sheep-farming (*meat*, *milk*, *fur*, *wool*) live in the villages. In order to establish the function of the *polonyna* pasture as a hot spot of *biodiversity*, a renaissance of sheep-farming seems to be a good start. This could be realised with certain promotions.

However, the following circumstance must be considered. At the moment, deer *hunting* is common in the mountains; thus, the stocks of the respective animals are in danger to be hunted too.

Initial conditions for re-using the *polonyna* pasture. The sum of *active air temperatures* in the *polonyna* pasture equals not more than 600°. The

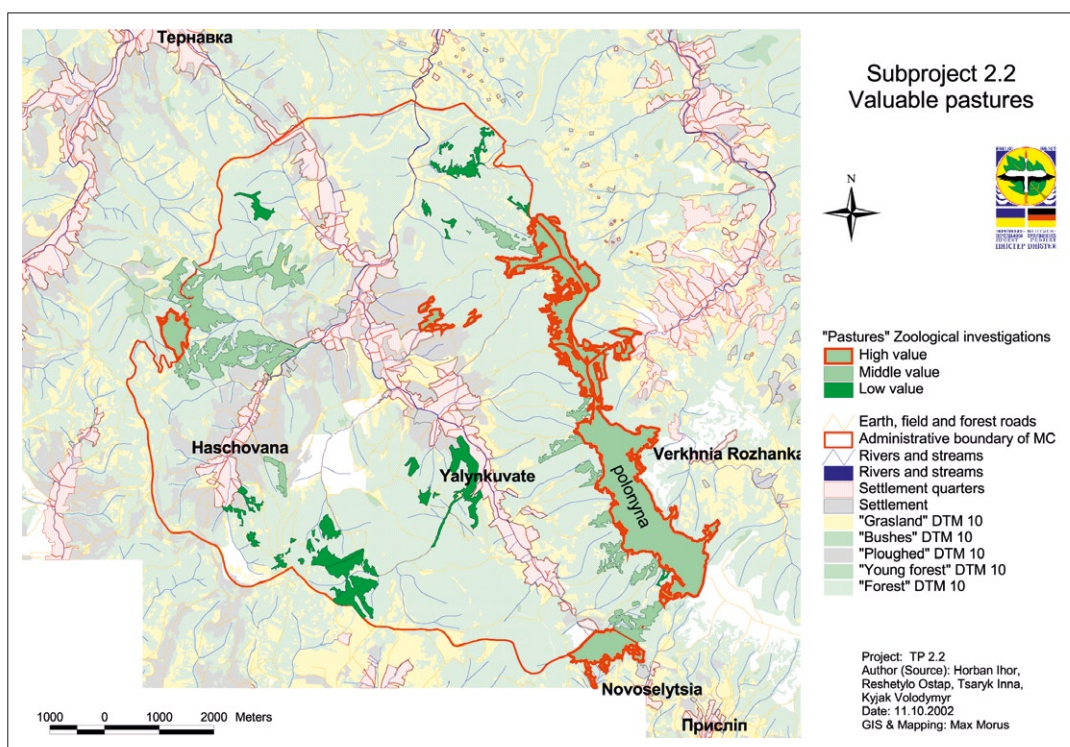


Fig. 3: Location of the *polonyna* pastures in Volosianka

grazing period starts at the end of May / in early June and lasts 80 to 100 days as a rule. The composition of plant species on the *grassland* is suitable for pasturing of *sheep*. *Nardus stricta* dominates amongst the grassland. The animals only like to eat that in early vegetation periods.

Combined usage of *meadows* and pastures is one of the rational methods of the keeping of a flock of sheep: in early spring, the animals graze in lower meadows. Each peasant uses the meadows of his own property for the sheep, as well as small areas in the *forest* and at the *forest edge*. When the animals go to the *polonyna* in summer, one can harvest the *hay* in these areas. In lower areas, when the grass grows again after the hay harvest, the sheep, having been droved off the *polonyna*, can pasture again. The natural keeping of the sheep guarantees that both the *polonyna* pastures as well as the lower meadows are supplied with *organic fertiliser*. Another positive thing about this form of pasturing is the fact that most of the *weeds* are removed during the mowing.

Recommended sheep breeds. For centuries or even millennia, the inhabitants of the Ukrainian *Carpathians* have been dealing with sheep-farming. The most common breed in the private sector is the local Carpathian breed which was bred by means of constant breed selection. This sheep is a typical representative of long-tailed *Zakel sheep* which are common in many countries of the Balkan Peninsula. Their direct successors are the *Romanian Zurkan sheep* (TUROK 1959).

The Carpathian breed is characterised by combined achievements – it is a breed combining *wool*, *milk* and *leather* use. The productivity of these animals is not high. They mature late, are medium-sized, of compact harmonic build, have a tough constitution and a solid skeleton. The average weight of adult animals is about 28–30 kg. The meat output (at 43–48 %) is not high. A ewe's output during 170 lactation days is about 70–80 kg of milk at a fat content of 7 to 9 %. After the lamb has been ~~separated~~ from its mother, one can get 15–20 litres of milk from any ewe. The wool pro-

ductivity (pure fibre wool) of wethers and ewes is about 1.0–1.5 kg. The medium fertility of ewes varies from 106 and 120 lambs per 100 ewes.

The special value of this sheep-breed is not their high productivity or the quality of products, but their good ability of adapting to humid and cold climate and the Carpathian relief. The wedge-shaped pointed facial part of the head, sharp incisors and narrow flexible lips enable them to graze on low and light vegetation and even to find fodder in these very lean pastures. Their rough long wool protect them from unfavourable atmospheric conditions.

In addition to the Carpathian breed, the zigaic breed was quite common in the Carpathians until recently. The *kolkhozes* as well as the *sovkhozes* dealt with the breeding of this sheep-breed. Over the course of reorganisation and the decline respectively of collective agricultural farms, the stock of this sheep-breed declined disastrously. Between 1991 and 2004, the total stock of sheep and goats in all farm categories of the Oblast of Lviv fell from 64,000 to 29,300 heads, and from 43,000 to 900 heads only in big agricultural farms. At the same time, however, the private stocks of peasant families rose from 21,000 to 28,400 heads. Early in 2004, the sheep and goat stocks of private peasant families was at 776 heads in the Rayon Skole, and even 1,807 heads in the Rayon Staryi Sambir. Considering the character of agricultural areas in that region, this is very little. The zigaic breed is quite suitable for intensive sheep-farming. However, in our opinion; it is not suitable for being kept in private family farms. The Carpathian breed is more advantageous there.

According to a survey in the field of mountain sheep-farming, one aims at a stocking of 10 sheep per ha at an output of the grassland of 38 dt/ha (HULCHYI et al. 1978), in order to guarantee the maximum output in natural pastures. Thus, one guarantees an increase of *livestock* of 1.52 dt/ha and the production of 8.8 kg/ha of wool. However, since the aim of pasturing farm animals in the *polonyna* pasture of *Volosianka* is not to keep the maximum output, but to support the ecological balance, one could also suggest a stocking of 3 sheep per ha with the subsequent monitoring of

the *polonyna* pasture. Taking into consideration that the total area of that pasture equals 600 ha, the population of *sheep* to graze in this pasture in summer has to be 1,800 heads. This is twice as much as the total sheep-population in the Rayon of Skole at the beginning of 2004.

The sheep stocks are endangered by attacks of *carnivores* while they graze on the *polonyna*. The *bear* is currently rare in the area around *Volosianka* but the *wolf* is quite frequent even in close vicinity to the villages (Fig. 4).



Fig. 4: The wolf is frequent in this part of the Carpathians

The *Carpathian shepherd's dog* represents an effective protection against wolf attacks and is well adapted to the climate of the high mountains and furthermore, common in other parts of the Carpathian mountains today (Fig. 5).

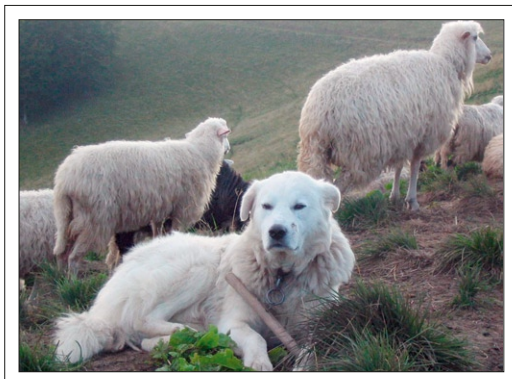


Fig. 5: The Carpathian shepherd's dog is the native race adapted well to the mountains

Estimation of costs. In our opinion, measures have to be carried out for a superficial optimisation before sheep-farming in the *polonyna* pasture of Volosianka can be organised. The setting aside of the pasture led to many valuable plants having ceased to exist in its grass stand. The output decreased rapidly. It is necessary to regulate the water and air balance, to remove *weeds*, to rejuvenate the pasture through disc ploughing and furrowing, to seed herbs again, to fertilise the *soil*, to remove eyries and *shrubs*. According to our calculations, the costs for such measures would be about 90 UAH (14.52 €) per ha at the state of 2003. Taking the *inflation* index into consideration, this amount must be increased to the state of 2004: 100 UAH/ha (16.13 €). The nonrecurring costs for superficial optimisation of the whole pasture are approx. 60,000 UAH (9,677 €).

The most rational method for using a pasture for sheep is fenced-in pasturing. This makes sense because not the whole pasture can be used at the same time; just a part of it. The gradual usage of a pasture supports an improved grass-growth and reduces costs for the keeping of the sheep in summer.

Rough grazing means that the meadow is not used rationally, because the sheep are free to move and only eat the good grass. Plants which taste worse (including weeds) remain unaffected in the pasture. This supports the development of weeds. When their number increase, the pasture is overgrown by weeds. Such a form of pasturing will inevitably mean that the most valuable plants for feeding and *nature conservation* will quickly drop out of the grass stand.

The size of the fenced-in area depends on the grass stand and the size of the flock of sheep. The approximate size of a fenced-in pasture for 100 sheep should be about 3–4 ha. If there are 200 sheep in a flock, the pasture should be doubled. The fenced-in pasture must be wide enough to enable the animals to move without hitting each other when they pasture in one row.

Our calculations (carried out in 2003) showed that the costs for fencing of 1 ha of pasture (by using local building materials) are at about 800 UAH (129 €). Since this number was calculated for smaller *pastures* located in depressed ar-

eas, one could argue that the costs for the large *polonyna* pasture of Volosianka should approximately amount half of that figure: due to the restriction of the melioration to the surface layer of the pasture totalling 400 UAH/ha (64.50 €) or 240,000 UAH (38,710 €) for the whole pasture.

In addition to the measures named, a shelter for shepherds must be provided in the pasture. The *water supply* must be guaranteed. Traditionally, the so-called Kolyba cabins were set up in *polonyna* pastures for the shepherds' everyday needs and for converting sheep products. Today, it would be better to use mobile shepherd coaches or cabins. It is also necessary to build sheds for the animals. Starting from the building standards usually applied for *animal husbandry*, the shed must provide 0.7 m² per animal; i.e. 1,260 m² in total. Rough calculations show that such accommodations are worth about 200,000 UAH (32,258 €). Setting up paths leading to the pasture will also bring about certain costs. Thus, funds of approximately 500,000 UAH (80,645 €) will be necessary for the organisation of *sheep* pasturing in the *polonyna* pasture of Volosianka.

According to the statistical survey the current sheep-stock in Volosianka is not more than 15 heads. Increasing the sheep stock to 1,800 heads demands certain measures. We are not of the opinion that the foundation of a specialised farm will be the solution to tackle current problems. Highly concentrated production has the tendency of intensifying which would bring about a conflict between economic and ecological targets. In addition, the foundation of a special farm demands big investments for building new sheep stalls. Fulfilling the requirements for sticking to the calculated sheep-stock in *private family farms* seems a lot more sensible. This guarantees better care for the animals, for the local population has not yet lost its experience of keeping sheep. This experience is passed on from one generation to the other very quickly. Apart from that, the lack of areas which are in corporative usage will guarantee that the necessary fodder basis is not established in a specialised farm. The farm businesses, on the other hand, are able to take care of the fodder, partly by changing their land structure.

The development of sheep-farming in private family farming of the peasants – Problems hindering the realisation. In the community of Volosianka, there are 732 family farm businesses. On average, each business has 2.5 sheep. This number guarantees that there is enough room for the animals in the village. In our previous preliminary report we stressed the fact that the development of *cattle husbandry* in the community has been accelerated by increasing the market price to 5–6 UAH/kg (0.81–0.97 €) for live weights and to 10–11 UAH/kg (1.61–1.77 €) for slaughtering weight in 2002. At that time, this led to peasants not selling their young *cattle* which were a couple of months old anymore but fattening them up to a weight of 400 to 500 kg. There were peasants in the village keeping 10 to 12 mast cattle. In 2003, however, the live weight prices decreased to 2–3 UAH/kg (0.32–0.48 €). This led to an increasing lack of faith in the reliability of that business. Although high prices returned in 2003, there were no new activities in cattle husbandry. Most of the young peasant families tend to look for other occupations. Thus, there are unused capacities in agricultural farms for stable keeping of farm animals which would be sufficient for the additional *sheep-stock*.

The decline of sheep-farming and the ceased usage of the *polonyna* pasture have been caused by economic reasons, particularly the lacking reliability of animal husbandry. Since the food basis of the villagers is *milk* and *milk-products*, the *cow-stock* has been kept and even partly increased. In this context, the peasants do not expect labour costs or financial costs.

Sheep-farming found itself in a different situation. When a peasant has to face the dilemma to decide which animals he has to give up keeping, he decides to give up that animal which is less likely to satisfy the daily needs of his family. A cow will always be preferred.

The key problem in sheep pasturing in the *polonyna* pasture in Volosianka is to motivate the peasants to keep sheep in their businesses and to drive them to the *polonyna*. Having examined different ways of solving this problem, we agree on the necessity to introduce a *subvention* for pasturing the animals on the named *pasture*.

The subvention must be high enough to make sure the subsidised peasants will get certain economic advantages. At the cost of the subvention, *sheep* products are to be supported; a part of these funds will be spent for paying shepherds, amongst other things.

10 shepherds herding a sheep-flock will be paid the amount of 30,000 UAH (4,839 €) during the grazing period (100 days), with the average daily wages being 30 UAH (4.84 €). If a peasant receives a subvention of 2 UAH (0.32 €) for each day the sheep spend on the high pasture, the total amount of promotion will be 360,000 UAH (58,065 €) per year. When he keeps 10 sheep in his yard, a peasant will receive a *subsidy* of 2,000 UAH (322.58 €) for the *grazing* period. It appears that the amount named will motivate the peasants to keep sheep. The supply of the animals during and after the grazing season will be guaranteed by the peasants themselves. Educational advertising amongst the peasants is to increase their faith in the new system. This will help to create the necessary preconditions for the enlargement of the *sheep-stock* in family farm businesses.

Today, there are no internal sources for the maintenance of the necessary subsidies. Thus, to implement the project needs the support of foreign ecologic institutions and foundations.

Effects of polonyna pasturing. The considerable enlargement of the sheep-stock and the usage of the *polonyna* pasture change the socio-economic situation in the community *Volosianka*. It has already been shown that the village population consumed 520 litres of *milk* per inhabitant in 2003, which is far above the norm (360 l). The per-capita-consumption of *meat*, in contrast, was considerably below the norm: 25 kg against a norm of 80 kg. In this context, significant changes take place in the structure of the farm animal populations of *private family farms*. The stock of *dairy cows* slightly decreases. If a farm abandons a cow, it can increase its sheep-stock by 10 heads: their food demand is about the same. Above all, this brings about changes in the structure of cultivable land. The supply of the population with meat products will increase.

There is a demand of mutton in the cities of the *Carpathian* region. This demand, however, is hardly satisfied, since the sheep-stock is too small. Yet, mutton shows better dietary characteristics than *pork* and is barely inferior to veal. Especially the meat of young animals, slaughtered about one year after their birth, is valuable.

Increasing the sheep-stock to 1,800 heads at an average daily per-capita-increase of 70 g results in a total yearly increase of 450 dt live weight, i.e. approx. 200 dt slaughtering weight. Even if only half the meat is brought to market, the inner per-capita-consumption of meat in the community of *Volosianka* increases by 13 kg (that is 50 %). In contrast, the milk-consumption decreases towards the rational norm.

The existence of a large flock of sheep near Slavske, a *recreation* place in winter, which is well-known throughout *Ukraine* leads to the renaissance of many industries which used to exist in that region few decades ago but are nowadays declining. Above all, this accounts for the production of feta cheese which disappeared from the shops a long time ago, but which consumers would love to buy again today. The manufacturing of traditional *huzulian* blankets made of sheep wool and lambskin coats are common again (□ *Ukrainian Tribes in the Ukrainian Carpathians and their Traditions*). Experienced master craftsmen of these farms still work in the neighbouring Oblast of Ivano-Frankivsk. The implementation of the suggested scenario for the development of sheep-farming and the usage of the *polonyna* leads to an advanced development of the branch of sheep-farming throughout the whole Carpathian region. Thus, not only the mountain areas are improved, the diversity of *flora* and *fauna* is kept and increased. The whole thing turns the scales for the general development of sheep-farming and the

kinds of products which are closely associated with it. Indeed, a lot of new jobs are created. The renaissance of sheep-farming blends well with the perspectives of the development of that region as a leisure area (□ *The Potential of Tourism in Western Ukraine*).

The changing price policy on the market of animal products is another argument in favor of the named scenario for a renaissance of *sheep-farming* and the usage of the *polonyna* in *Volosianka*. During the last time, more and more characteristics of the so-called “meat crisis” have been seen in the *Carpathian* region as well as in the whole country. The prices for *meat* and meat products almost rose about 50 % only in one month. This is obviously a consequence of the government’s inconsiderate policy, especially on the grain market. The price for 1 kg of *pork* and *beef* reached in autumn 2003 40 UAH (6.45 €), i.e. twice the price of that year’s summer. In Lviv, the retail prices rose not that much. Yet, the wholesalers often purchase the animals at a price of 14 UAH/kg (2.26 €) live weight. In 2002, this price was half of that amount.

It can be predicted that the meat crisis with its high market prices for meat will continue in the country. The reason for the crisis is the lacking *mast cattle* stocks. It will presumably take 2.5 years to reach the necessary animal population. This results in a favourable price situation for the development of all directions in keeping mast cattles, including sheep-farming. It might be sufficient to grant the *subsidies* suggested just for one year; they could fulfill the part of an initial promotion. Due to the favourable price situation and profitability of sheep-farming, the necessary number of animals will then be kept. There are good reasons for this conclusion.

Recommendations for land use planning

- ▷ for supporting the organisation of a *sustainable agriculture* the legal and economic aspects of the foundation of *agricultural cooperatives* as well as the foundation of *credit cooperatives* in the *Upper Dnister Basin* are explained
- ▷ sheep farming for the abandoned pasture on the *polonyna* of Volosianka is recommended to strengthen the agricultural income structure and to improve the food supply in the village