Mechthild Roth / Ralph Nobis /
Valentin Stetsiuk / Ivan Kruhlov (Eds)

Transformation processes in the Western Ukraine

Concepts for a sustainable land use

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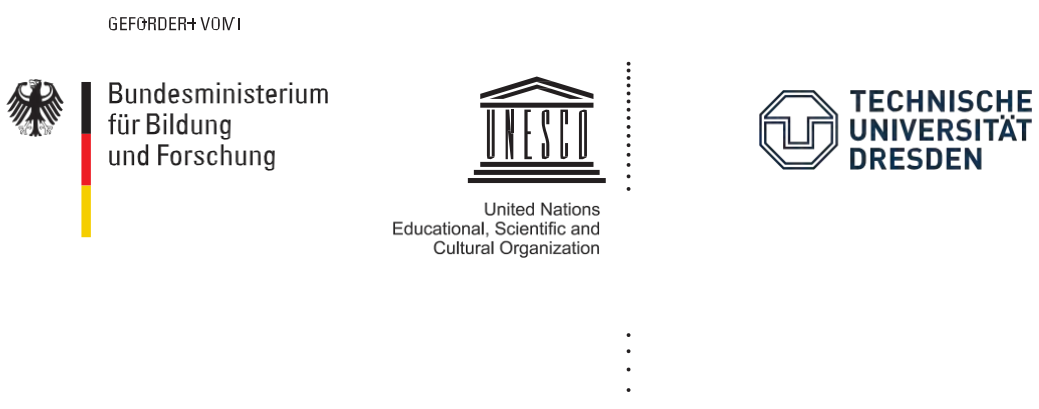

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Preface

The cooperation of German and Ukrainian nature scientists has a long tradition and a changeful history. During the Soviet regime contacts of Ukrainian scientists with research institutes of e.g. Western Europe had been restricted and were strongly controlled. With the political changes, initiated by Gorbatchovs "Perestrojka" also the scientific communication started to increase. On the environmental sector especially the nuclear catastrophe of Chernobyl promoted the need for an exchange of knowledge. As a consequence of radioactive environmental contaminations the Soviet government agreed also to the foundation of non-governmental organisations.

One of the first, that was founded in Ukraine in 1987 was Tovarystvo Lewa. Due to severe pollutions of the Dnister in Western Ukraine caused by emissions of a chemical plant some years ago, Tovarystvo Lewa focused their activities also on the protection of this river ecosystem. To receive international public awareness this NGO organised since 1988 nature conservation expeditions on the river Dnister. One guidance of this expeditions carried out by float was Valentin Stetsyuk.

In 1993, Stephan Niemeier, a German activist of environmental movements and a student of nature conservation at Philipps-Universität Marburg participated in this expedition and met with Valentin Stetsyuk. This meeting was the starting point for a long lasting personal friendship and gave rise to the idea of a German-Ukrainian research-project on the ecology of the river Dnister. Returning back to Marburg with enthusiastic feelings for the unique landscape of the Dnister valley it was easy for Stephan Niemeier to convince his supervisor, Prof. Dr. Harald Plachter, who is always fascinated by the idea to make impossible things possible, of the realisation of a binational nature conservation project. Without doubt, it is the honourable merit of Harald Plachter to give the idea of a German-Ukrainian research-project first scientific contents and above all to open up the necessary financial resources for the realisation of a nature conservation research project in the Western Ukraine. Thus, in 1995 a pilot study, financed by the "Stifterverband für die deutsche Wissenschaft" and supported by the "Ukrainian Ministry of Nature Conservation" started. Due to the successful results of the pilot project, Harald Plachter succeeded to spark the interest of the German Ministry of Education and Research in the German-Ukrainian scientific cooperation.

Starting with April 1997 the German Ministry of Education and Research funded the binational interdisciplinary research-network with three phases (Tab. 1). Thus, the editors and all other coworkers are indebted to the BMBF. Without the financial support, it would not have been possible to realise the project. Special tribute has to be payed to Beate Schütze, Dr. Ingo Fitting, Katharina Sempf and Dr. Joachim Kutscher from the Project Management Organisation Jülich in the Jülich Research Centre for their efforts in realising the research project. The research project was run under the patronage of the UNESCO. We have to express our gratitude to Mr. Vefa Moustafaev and Mr. Mustafa El Tayeb.

Additional support was given by the German Academic Exchange Service (DAAD), which is greatfully acknowledged.

The results of the first two project phases, that were run under the coordination of Philipps-Universität Marburg, documented the unique value of the cultural landscape of the Dnister valley, which is caused by manifold landscape attributes and a high level of biodiversity. On the other hand the transformation processes starting in the 90s have lead to severe alterations of economical condi-

Tab. 1: Phases and targets of the German-Ukrainian BMBF-UNESCO research project "Transformation processes in the Dnister Area (Western Ukraine) – Concepts for sustainable land use

Phase	Duration	Project title
1st phase	April 1997 – August 1998	Ecological analysis and evaluation of the nature conservation value of the Upper Dnister Basin as a model for the development of a river landscape
2nd phase	June 1999 – December 2000	Transformation processes in the Dnister area (Western Ukraine) – (FKZ: 00339699B/6)
3rd phase	October 2001 – December 2005	Transformation processes in the Dnister area (Western Ukraine) – Transfer and implementation of the results into land use planning – (FKZ: 0339699D)

tions and put high pressure on the ecological status of the landscape. Thus, it was a big challenge for a collective of Ukrainian and German scientists to develop in the third project phase, that was coordintated by Technische Universität Dresden, sustainability concepts for selected model regions of the rural landscapes of the Dnister catchment. Besides Dr. Winfried Kuhrt, Berlin (former Senior Legal Secretary, Ministry of the Environment, Lower Saxony), numerous Ukrainian and German scientists from the following institutions contributed to the results of the third project phase, that are published in this book:

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On behalf of the editors
M. Roth

The "Dnister Project" – Targets and Characteristics of the Investigation Area

M. Roth, J. Tsaryk, I. Kruhlov and R. Nobis

As a result of the Earth Summit (UNCED: United Nations Conference on Environment and Development) held in June 1992 in Rio de Janeiro, 170 countries have signed the ***Agenda 21,*** a wide ranging action plan to improve the conditions of the environment and to ensure the sustainable development based on the rational use of natural resources. A basic approach of the Agenda 21 for a development that meets the needs of the present without compromising the ability of future generations to meet their own needs is the integration of environmental aspects in all other fields of politics. Thus, a ***sustainable development*** has to be based on the harmonisation of ecological, economical and social factors of development.

In economically well developed countries the guidelines for the future development which is in accordance with the needs of ***sustainability*** are mostly defined. Partly due to the long lasting and complex processes of restructuring economy and administration transformation countries are still standing at the beginning of the process which results in the implementation of principles of sustainability in the further development of the society.

This applies for ***Ukraine*** too, despite the fact that on the national level several laws and ordinances of the ministerial cabinet and the president concerning the sustainable development have been passed. Their successful implementation on subordinate geographic levels depends to a large part on the regional and local peculiarities of the transformation processes that occur in society, economy and policy as well as on the ac-

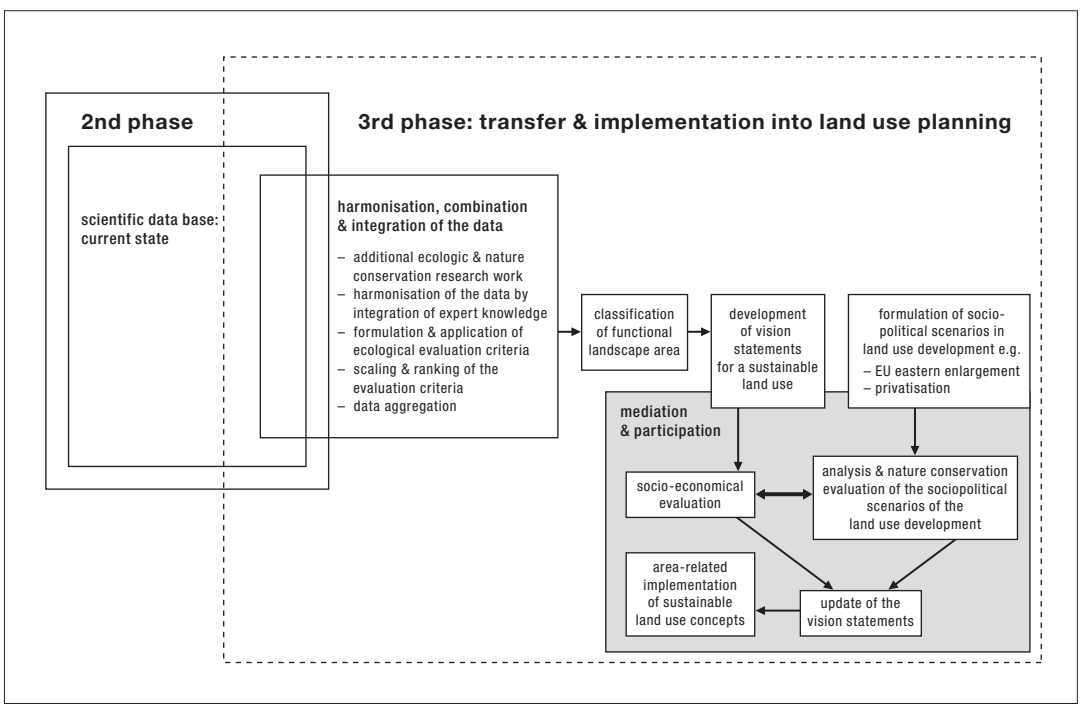


Fig. 1: Working steps of the project

ceptance by local, regional and national decision makers and state-run financial support. Moreover, one of the most important factors that cause the slow pace of the implementation process is the lack of scientifically based concepts for the sustainable use of natural resources which simultaneously ensure the economic wealth of the population. Of special importance in this context are the rural ***cultural landscapes*** of Ukraine that are characterised by agricultural use and forestry and on the other hand a high nature conservation value and that will probably undergo severe alterations due to an increasing influence of a global market economy.

Based on a broad spectrum of scientifically assessed data on natural site conditions (e.g. geology, hydrology, and climate), botanical and fauna biodiversity, land use systems, and socio-demography, the German-Ukrainian research-network aimed at the development of concepts for the sustainable development of rural cultural landscapes in the western part of the transformation country Ukraine. The focus of the research project was laid on the effects of the transformation processes on the sectors agricultural land use, forestry and flood regime including their economic aspects. Starting with the aggregation of the ecological, socio-economic and agricultural data regionally differentiated goals for a ***sustainable land use*** were developed and harmonised with the scenarios for the future development of Ukraine in an iterative process (Fig. 1). The investigations were carried out in close cooperation with Ukrainian decision makers on the local, regional and national level and with corporate organisations of agriculture and forestry to ensure the practical realisation of the concepts of sustainability. For the evaluation and visualisation of the results a GIS based data base adapted to the investigation area was generated.

The investigation area

To develop recommendations for land use systems that correspond with ecological and nature conservation targets and to evaluate their socio-economic effects the ***Upper Dnister Basin*** was selected as model area. With its fluvial topography it is representative for large parts of the Western Ukraine and moreover for other mountainous areas of Central Eastern Europe.

The Upper Dnister Basin is rather conditionally defined by the confluence of the main river (the ***Dnister***) with its small northern tributary, the Koropets. The catchment of the upper Dnister comprises an area of 21,493 km². It constitutes about 30 % of the whole Dnister Basin (Kaganer 1969) and 3.5 % of the territory of Ukraine. The Upper Dnister Basin is almost completely located in Ukraine, except for the small most westward part of 231 km² in the headwaters of the Stryvihor river, which belongs to Poland. The Ukrainian area of the Upper Dnister Basin is assigned to three administrative units: the Oblasts of Lviv (11,017 km²), Ivano-Frankivsk (8,349 km²), and Ternopil (1,896 km²) (Fig. 2).

Fig. 2: Location of the investigation area in the Western Ukraine

Within the Upper Dnister Basin three model regions, representing the classification of natural areas of the western Ukraine were selected (Fig. 3).

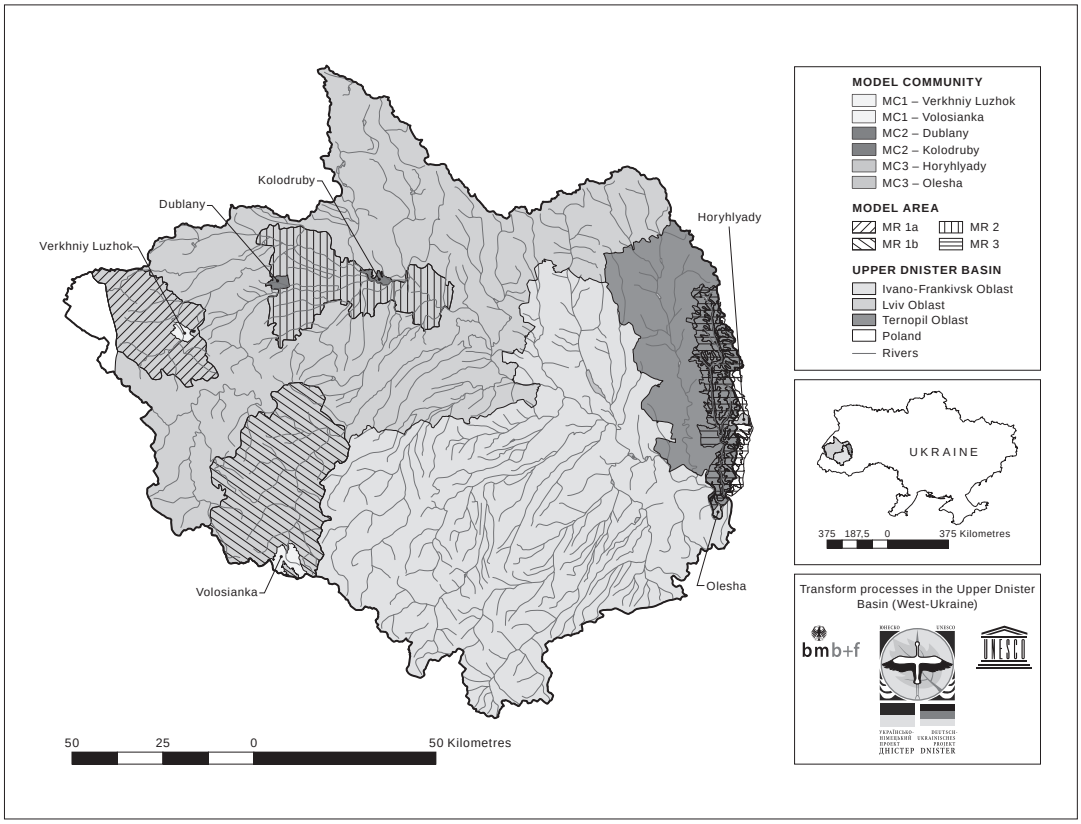


Fig. 3: Location of the model regions and model communities

Model region 1: Carpathians

The Carpathian model region 1 is divided in model region 1a (lower Carpathian highlands) and 1b (Carpathian highlands).

The model region 1a (MR 1a) is located in the Oblast Lviv. As model community representative for the lower parts of the ***Carpathians*** Verkhniy Luzhok was chosen. It consists of two settlements – the villages of ***Verkhniy Luzhok*** and ***Busovysko.*** The community has about 2,210 inhabitants, occupies an area of 2,278 ha and belongs to the Rayon ***Staryi Sambir*** within the Oblast of Lviv. It is located at a distance of about 100 km from Lviv and about 10 km from Staryi Sambir. The community is characterised by a relatively good road and railway connection.

From a natural-geographic point of view, the community is located in the Dnister Beskids low mountain region on both sides of the Dnister river valley. The terrain is characterised by significant elevation spans (368–780 m a.s.l.), steep and very steep slopes dissected by gullies, and moderately cool climate, which caused the formation of brown mountain soils under ***fir***-beech natural forests. Alluvial soils and gravel under willow and alder natural communities occupy the terraced river valley bottom (for more detail see

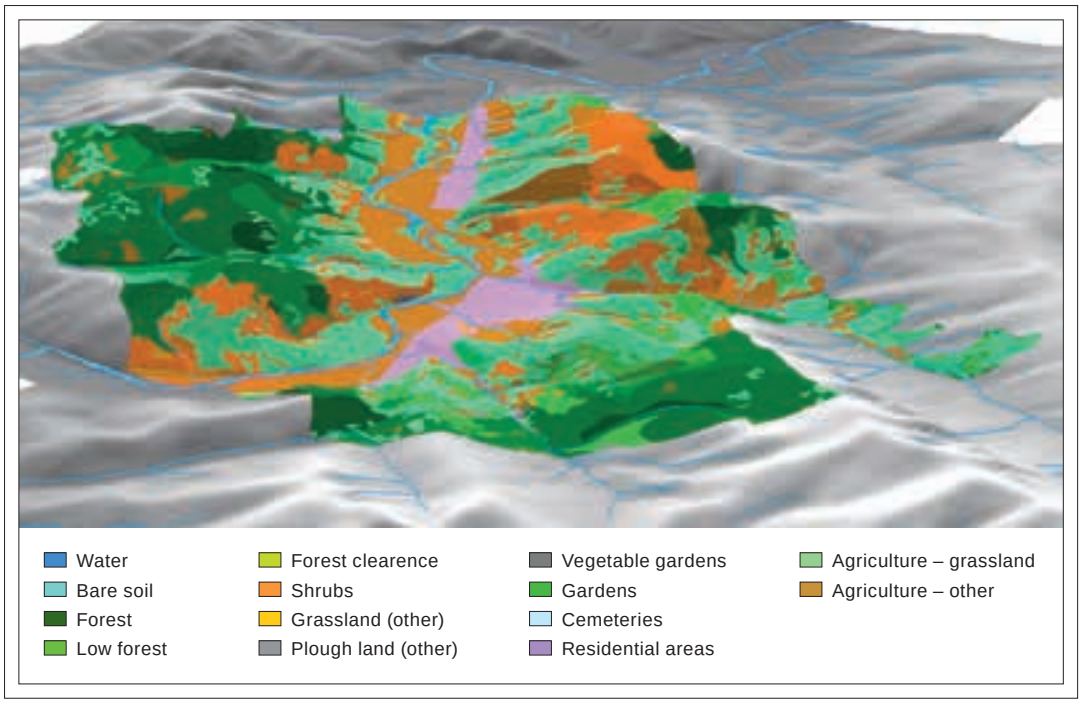


Fig. 4: Map and land coverage of the model community Verkhniy Luzhok

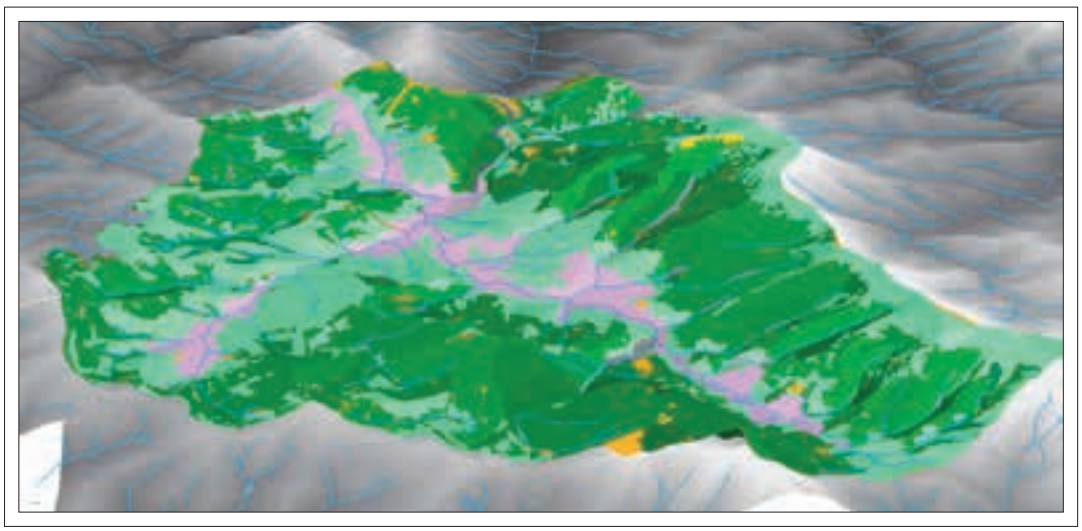


Fig. 5: Map and land coverage of the model community Volosianka (for legend see Fig. 4)

🕮 *Natural Geoecosystems of the Upper Dnister Basin*). The natural landcover has been significantly changed during the centuries of economic activities of the local population. Now the area appears to be a semi-open landscape with patches of ***grassland*** and ***arable land*** in-between the settled and forested sections (Fig. 4; 🕮 *Current Land Use Structure of the Upper Dnister Basin and Recent Changes in the Model Communities*).

The model region 1b (MR 1b) includes the model community of ***Volosianka*** (2,378 inhabitants) which covers an area of 6,825 ha and includes the

larger village of Volosianka as well as the smaller villages of ***Yalynkuvate*** and ***Hashchovanya.*** The community belongs to the Rayon Skole of Lviv Oblast and is located at the very periphery of the administrative units – at the border with Transcarpathians and Ivano-Frankivsk Oblasts. The location is a kind of cul-de-sac formed by mountain ridges with only one bad mud road of about 7 km leading to Slavske – a well-known national mountain ski resort and the nearest railway station. The distance is about 150 km to get from Slavske to Lviv and about 25 km to Skole.

The community of Volosianka is located in the internal ecoregion of the Eastern Carpathians called Verchovyna. These are low and middle flysch mountains with the elevation span of 620–1,250 m within the community territory, steep slopes dissected by gullies, and cool climate which caused the formation of brown mountain soils under spruce-beech natural forests (for more detail see 🕮 *Natural Geoecosystems of the Upper Dnister Basin*). The settlements are located in relatively narrow valleys, and the natural landcover has been significantly changed during the centuries of the economic activities of the local population. On the present day semi-open landscape has patches of grassland and clear-cuts in the matrix of secondary forests with the domination of ***spruce*** (Fig. 5; 🕮 *Current Land Use Structure of the Upper Dnister Basin and Recent Changes in the* ***Model Communities***).

Model region 2: *Precarpathians*

The model region of 584 km² is located in Lviv Oblast and embraces the so-called Upper Dnister Depression. Its western part belongs to Sambir and Drohobych Rayons, while the eastern part is shared by Horodok and Mykolaiv Rayons. There are about 40 villages in the region. Lviv is located to the north-east at a distance of about 40 km, whilst there are several towns to the south-west: Sambir, Drohobych, and Stryi.

The model region occupies the wide (up to 8 km) Dnister valley filled with peat and alluvial deposits as well as wavy uplands with gentle slopes and loess cover forming the southern limit of the valley. The uplands are separated by relatively wide (1.5–3 km) secondary river valleys. The elevation span is 240–370 m a.s.l. The natural vegetation is represented by alder forests and wet meadows in the valley bottoms, and by oak-hornbeam forests on the uplands (for more detail see 🕮 *Natural Geoecosystems of the Upper Dnister Basin*). Today, this is primarily an agricultural region occupied by grassland and arable land.

There are two model communities chosen in the model region: The community of ***Kolodruby*** is located at the eastern part of the wide Dnister valley and belongs to Mykolaiv Rayon. It has 1,077 inhabitants and covers an area of 1,736 ha. The distance to Mykolaiv is about 15 km, while to Lviv – about 55 km. The area is rather flat – the elevation span is 250–270 m a.s.l. The soils vary from peat and alluvial silt in depressions to podzolised loamy sand on more elevated parts. The natural vegetation was dominated by ***oak*** and alder forests. Today, forests occupy only a small portion of the community land, giving way to grassland and arable land (Fig. 6).

The community of ***Dubliany*** has an area of 2,560 ha and a population of 2,300 inhabitants. It is located at the southwestern limit of the model region on the elevated Dnister-Bystrytsia Pidbuzhanska ***interfluve.*** The community belongs to Sambir Rayon. The distance to Sambir is about 15 km, while to Lviv – about 60 km. The southern part of the community territory is situated in the flat bottom of the Bystrytsia Pidbuzhanska valley filled with alluvial silt and peat. The larger northern part is on the ***interfluve*** and is composed of loess-like loam with podzolised sod soil. The elevation span is 270–315 m a.s.l. The natural vegetation of the ***interfluve*** is oak-***hornbeam*** forest, with oak and alder forests in the valley bottom. Now arable land and grassland replace them (Fig. 7).

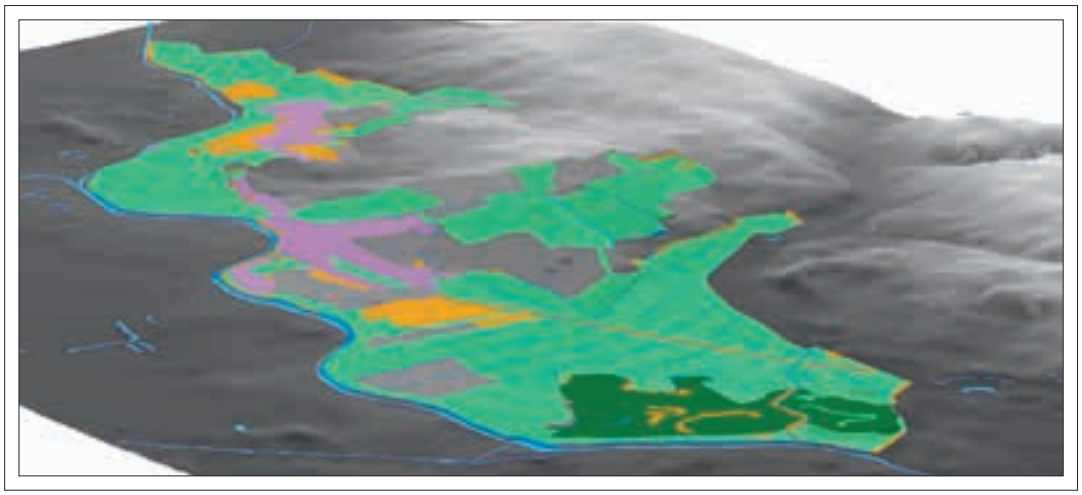


Fig. 6: Map and land coverage of the model community Kolodruby (for legend see Fig. 4)

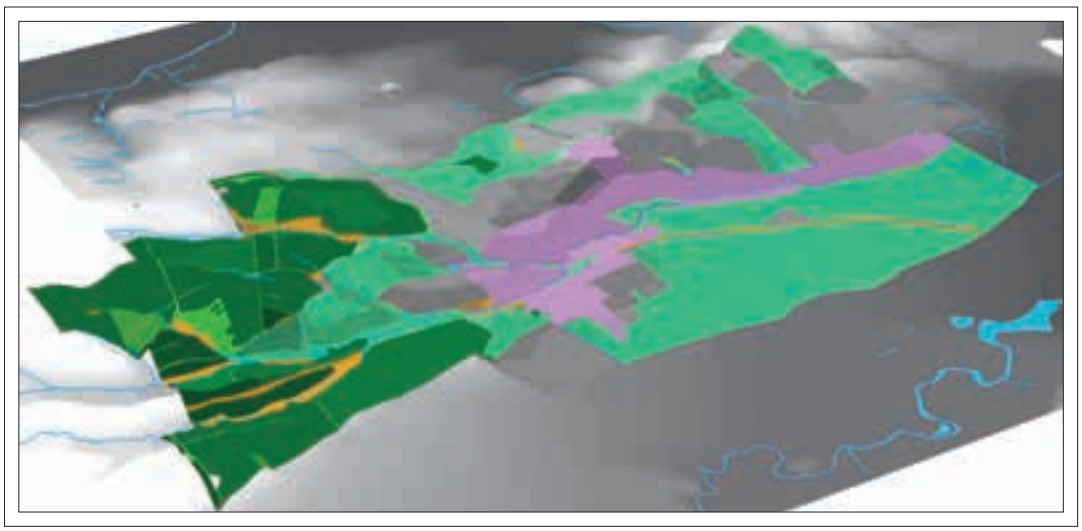


Fig. 7: Map and land coverage of the model community Dubliany (for legend see Fig. 4)

Model region 3: *Podolian Plate*

This area has 412 km² and is located at the easternmost part of the Upper Dnister Basin. It embraces parts of Pidhaytsi and Monastyryska Rayons of Ternopil Oblast. The towns of Monastyryska and Pidhaytsi are located within the area. The distance to Ternopil from the middle of the area is about 70–80 km. From the physical-geographic point of view, the area is located within the ***Koropets*** river basin at the eastern termination of the High Opillia ecoregion. The Koropets and the Dnister are deeply cut into a rolling watershed surface creating canyon-like valleys with steep slopes. The elevation span is 195–405 m a.s.l., and the canyon walls can have relative altitudes of over 200 m. The watershed surfaces have gentle to moderate slopes; they are covered with loess-like loam and occupied by chernozemic podzolised soils. Once they were covered with oak-hornbeam forests, but

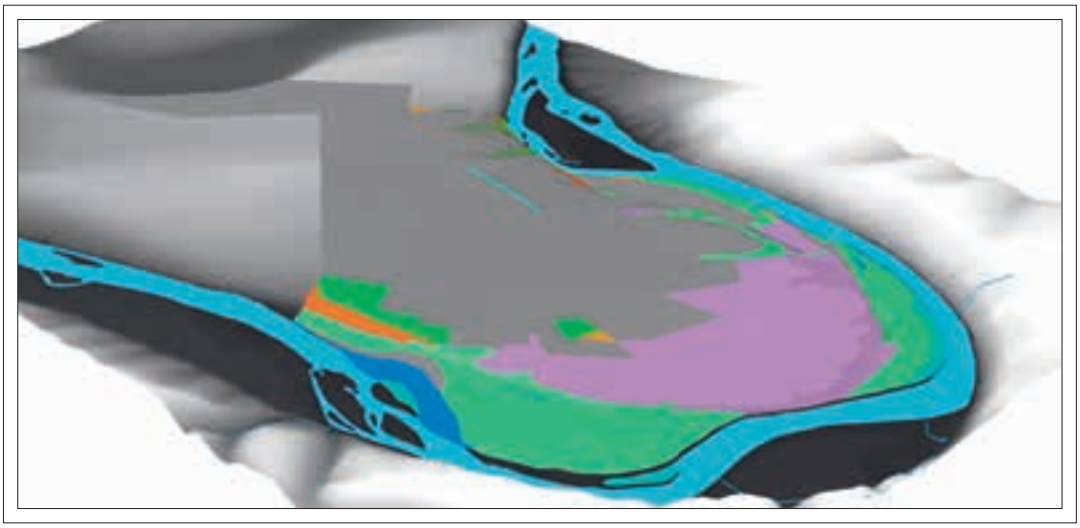


Fig. 8: Map and land coverage of the model community Horyhliady (for legend see Fig. 4)

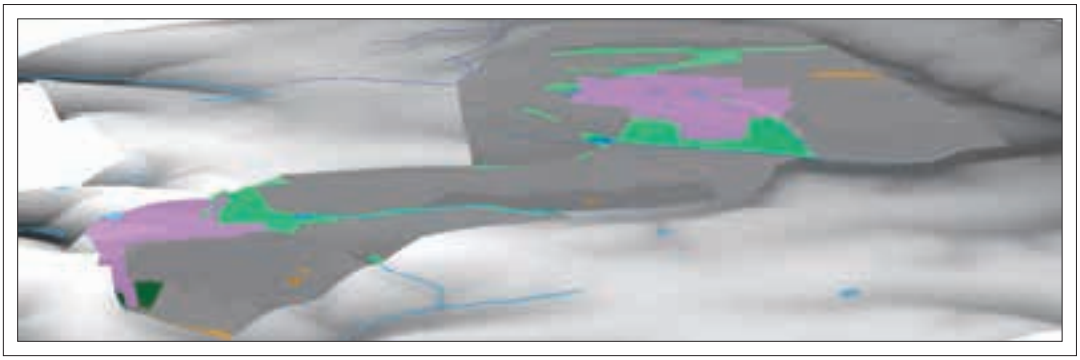


Fig. 9: Map and land coverage of the model community Olesha (for legend see Fig. 4)

now they are used as arable land. The steep slopes of the valleys with calcareous rock outcrops are covered with beech-hornbeam forests (for more detail see 🕮 *Natural Geoecosystems of the Upper Dnister Basin*).

Two model communities which are characteristic for the region were chosen. The community of ***Horyhliady*** is located at the south in the canyon-like Dnister valley at the confluence with the Koropets. It has an area of 847 ha, and a population size of 1,253 inhabitants. The community belongs to Monastyryska Rayon. The distance to Monastyryska is about 30 km, while to Ternopil – about 110 km. The community occupies gently and moderately sloping low and middle terraces with the elevations of 190–260 m a.s.l. The terraces are covered with loess-like loam that serves as a parent rock to chernozemic soils. Once the region was covered with oak forests, but now the forests are replaced by arable land (Fig. 8).

The community of ***Olesha*** (1,150 ha; 641 inhabitants) is situated at the eastern border of the model region. It also belongs to Monastyryska Rayon. The distance to the rayon centre is about 10 km. The village occupies the rolling watershed surface formed by loess-like loam. The elevations are between 350–390 m a.s.l. The oak-hornbeam forests that once covered fertile chernozemic soil were cut long ago and replaced by arable land. Forested patches are preserved only on the steep slopes of the valleys which are not suitable for ploughing (Fig. 9).

Transformation Processes in Middle Eastern and Eastern European Countries. Experiences, Comparisons and their Effects on Rural Areas

R. Nobis

Abstract / Анотація

З розвалом Східного блоку в 1989 і розпадом Радянського Союзу в 1991 р. у відповідних країнах почалися принципові зміни у сфері політики, економіки і суспільства, які називають трансформаційним процесом. Окреслюються характеристика і труднощі трансформації у цих трьох головних сферах. Оскільки кожна країна мала відмінні вихідні позиції та могли бути також різними стратегія і хід трансформації, описуються особливості найважливіших країн. Під кінець були розглянуті впливи сільського господарства спеціально на сільські реґіони.

Introduction

Transformation is in the following understood as the post-communist/post-socialist system transformation of the former Eastern Block. The collapse of the Eastern Block started in 1989 with the severance of the first countries. In autumn and winter 1989 the authorities of the state in all Eastern Block countries (except the Soviet Union) lost their monopoly on rule, so that the Eastern Block in practice ceased to exist. On 8th December 1991 Russia, Ukraine and Belarus as last remaining countries in the Soviet Union decided its disintegration as well as the foundation of the Commonwealth of Independent States (***CIS***). Transformation is the fundamental change of the society (Hodenius & Schmidt 1996). The system transformation is the transition from communism/socialism to a market economy.

The countries of the Eastern Block were characterised by a single-party dictatorship, a centralised planned economy and the state property of the production goods. In the course of the ***transformation processes*** it must be noticed that only after years, new structures in policy, economy and society were developed. A defined starting point and end of the processes does not exist. Besides they are processes of a permanent, again and again new starting and reflexive-recursive acting target-seeking event. „Goal" in the transformation process is less a stable desired state, but a permanent problem. The developments in the single sectors do not run parallel.

The transition processes on a social, but also on operational or local level, are to a high degree context specific and often only in view of some negative characteristics regarding „socialism" immediately comparable and respectively similar. Again and again extraordinary big national and regional specific varieties are showing. The Hungarian socialism as social space-time-unit has a completely different character than e.g. the socialism in the former GDR. The judging of socialism is different in Poland than e.g. in the former CSFR or in Bulgaria (Hodenius & Schmidt 1996). A synchronisation of the transformation processes in the three main categories (policy, economy, society) is almost impossible (Eger 2000).

Characteristics and difficulties of transformation processes

Policy. In theory the political transformation in its initial phase runs in two stages. In the first place it is a limited liberalisation of the authoritarian system against opposition powers. Second advanced democratisation steps between politicians willing to make reforms and moderate oppositions ignoring controversial questions. After that a long stage of consolidation follows, in which stable institutions and a democratic shaped political culture emerges. In practice mostly a different picture results caused by the high expectations of the voters and the missing willingness of the old rulers of opening up and handing of competences. The population has a lot to catch up on and wants above all speedy economic success; unpopular political decisions like tax increases were put off under the pressure to be re-elected (Weber 2002). It can be found in many countries that the exchange of the political elites hardly took place. In the few years of the radical change the parties could either not develop a clear profile or distinguish themselves from other parties. The voters do not show a bond with the election programmes yet, and no permanent preference for a party (Hodenius & Schmidt 1996). The result is a high fluctuation of voters and a strongly fluctuating poll. Newly founded parties had disadvantages against the communist parties better organised and equipped with a bigger property. In a few countries only like Poland and Hungary the communist party is regarded as fundamentally reformed (Süssmuth 1998).

From politics, there are quite conclusive impulses starting for the economic development. Thus the following points should comprise the reforms initiated by politics right at the beginning of the transformation: the right to private property, tax reform, tightening of the administrational organisation, a central bank independent from the state, breaking up of the large cooperatives and a price liberalisation (Wiegert 1996). A balance between reduction of the state interventionism and state control of the transformation processes means a big responsibility and challenge for a government. According to experts, the process of quick economic autonomy from policy and administration mostly failed (Hodenius & Schmidt 1996).

The gained liberty made new demands to concepts of foreign affairs. After decades of direct integration to the COMECON and Warsaw Pact with the corresponding dominance of the Soviet Union, the countries were forced to try winning an own political profile (Strobel 1993). The European adaptation and regionalisation weaken the state, but institutions for the processes on European as well as on regional level are missing (Hodenius & Schmidt 1996).

Economy. The organisation of the planned economy influenced the conditions of the economical transformation and caused problems at the transition to a market economy. The loss of traditional customer countries causes problems in the first stage at sales and export by the inadequate competitiveness of the products. Also problematic at the restructuring of industry is the mono-structural industry in many cities (Weber 2002). With the collapse of the industrial production there were no alternative possibilities of income for many employees. Hybrids from private and state companies proved to be the key for a successful restructuring of economic organisations, which are able to use the advantages of both forms of property (Hodenius & Schmidt 1996). Besides that, there also have to be institutions which stabilise the market requirements. This includes a reformed bank system (Eger 2000).

One of the most acute problems of the economic development was the interrupted money circulation at simultaneously decreasing economic activity. Starting point for the companies was the emerged cost-price squeeze between continuously increasing expenses (e.g. wages, raw materials, debt servicing) and at the same time decreasing earnings (lower production for lack of raw materials, collapsing markets, lower demand on the basis of highly decreased purchasing power). The savings attempts of the companies delayed the payment of bills (e.g. electricity)

and wages at simultaneous reduction of capacities (reduction of the output), reduction of production factors (e.g. personnel dismissal) and corresponding drop of e.g. raw materials, energy in view of the sales setback. This had considerable consequences on the financial state of the communities and cities (decrease in tax receipts, loss of consumption as well as increased public spending). The development could not be balanced by the upward trend in demand at the small businesses. The energy supply companies carried out compulsory switching offs after that. This created a vicious circle, because the companies can only become solvent again, when they have the possibility, to work with full capacity. The energy-saving measures concerned also companies, whose order situation would have made a higher utilisation of the capacities possible (Strobel 1993).

The development on the labour market is closely connected with the illegal economy. The officially often relatively low rates of unemployment can amongst others be traced back to the hiding of many employees in it. Thereby official statistics mostly do not describe the real composition of the income components. Besides that the continuation of subsidies for unprofitable companies keeping the unemployment figures low (Süssmuth 1998). But the in reality high unemployment slows down an economic transformation because the average real income and by that the purchasing power drop (Hodenius & Schmidt 1996). A comparison of the distribution of income before and after the start of the transformation shows consequently an increase of the unequal distribution of income referring to the official income (Tillack 2000). The labour market structure is in spite of the collapse of the industrial production still characterised by a high share of employees in the industrial sector compared to the West (Eger 2000). With that the low wage costs connected with the good training in labour-intensive branches can also be a competitive advantage on the world market (Wiegert 1996). In not capital-intensive branches (service, trade) the restructuring resulted best (Strobel 1993).

The business relations to the West are an important factor and influence the transformation speed. Although there were hardly western trade relations before 1990 (Süssmuth 1998), many countries show a West-East gradient with a better development of the western regions already long before the transition. Because the transformation processes are connected with high costs that neither the native economy nor the national budgets can take, the foreign investments are however indispensable. Experience showed that without these, no system transformation was so far successful (Weber 2002). The role of the state in economy hinders market-economy behaviour and economic relations to the West, but with missing state control "quick business" prevail like e.g. in Russia with the large scale export of foreign currency out of the country. Further impediments for foreign investments are the missing institutional minimum requirements (Hodenius & Schmidt 1996), a lack of clarity concerning the property situation (Eger 2000) and the prolonged building up of mutual trusts to new economic partners (Strobel 1993). The foreign investments made in the transformation countries were mostly concentrated on their metropolis (Weber 2002).

Socio-cultural sector. Besides the political and economical component the less numerically measurable sector of the social and cultural transformation plays a not to be underestimated role for its success. With the disintegration of the old, strong authoritarian political order the institutions were removed. This was accompanied by the disintegration of the system of norm and values (Hodenius & Schmidt 1996). Also the social services, which were often closely connected with a workplace (Wiegert 1996; 🕮 *Social and Demographical Aspects in Rural Areas of Carpathians and Precarpathians*), could not be maintained and were sometimes even abolished. All this has a negative effect on the psyche of society and also burdens the attitude to the necessary reforms and the willingness, to take part in it (Weber 2002).

The individual economic situation depresses the spirit of the population. In addition the result of the reform processes is uncertain. But at the same time the backlog and the aspiration to quick above all economic success is highly distinct. If

the interface between the population and the authority is missing by e.g. lack of dialogue, potential conflicts emerge and the authority is much faster than in traditional democracies confronted with a general loss of confidence (Süssmuth 1998). This is amplified by the phenomenon of the rising unequal distribution of income (see **Economy**). The danger, that a large part of the population lives in permanent poverty ensures a social cause for conflict. Further negative at rising income squeeze is the fact that the middle classes in post-communist countries are only poorly developed (Hodenius & Schmidt 1996).

This all result in political-cultural disorientation. The setting up of a new system of norm and values and the change from a patronised to a responsible citizen takes much more time than the economical or political transformation (Hodenius & Schmidt 1996; Süssmuth 1998).

Special characteristics of the countries

With the evaluation of the transformation process and the comparison of the countries to each other above all the individual starting position of every country must be considered. By no means is it so that the process started in every country at the same time with the same political system. For example countries like Hungary, Poland, and Czech Republic had previous democratic experience and a better starting position than the ***CIS***-countries, Romania or Bulgaria (Hodenius & Schmidt 1996). In Hungary and Yugoslavia even before the watershed, a socialistic market economy was practised with an earlier opening up to the West. Through the collapse of the Eastern Block numerous new countries arose, which had to carry out a much bigger transformation than countries, which already existed before (Weber 2002). Further differences result from the aspiration of some countries to an EU-membership with strict handicaps and a corresponding timetable (Eger 2000).

The participation of the civil society in the transformation processes brings an influence to the political development of the country. A gradient Poland-Hungary-Russia-Ukraine-Romania-Belarus with decreasing participation can be observed. With declining interest and exertion of influence by the population the preservation of power of the communistic elites is accompanied. In some countries the communistic party was able to quickly regain power (Lithuania 1992, Poland 1993, Hungary 1994, Bulgaria 1995). But in Poland and Hungary the reforms made already too much progress, to slow them down crucially after the changeover of power. Besides these two countries Slovenia, Czech Republic and Estonia are regarded as forerunner of a successful comprehensive transformation (Süssmuth 1998).

Former USSR. For the starting position of the transformation in the ***CIS***-countries it is of importance that the structure of the economic branches planned a regional concentration of monopolies. It means that only rarely more than one branch appeared at the same location. This causes special problems at a transition to a market economy (Wiegert 1996).

Obstacles of the transformation in Russia include the missing of a market oriented financial constitution as well as a money and lending policy of the central bank (Hodenius & Schmidt 1996). The privatisation was not carried out completely, e.g. the energy sector is not privatised. The transformation in Russia took place gradually, that means slowly and little by little, not based on such a concept, but conditionally by political disagreement. Thus, an unlegislated area developed that favoured corruption. The illegal economy is additionally supported by a deficiency of production (Wiegert 1996). The privatisation was used for personal gain, by liquidating profitable companies by insiders at low prices (Eger 2000).

Another problem in this context for ***CIS***-countries is the typical and especially high increase of

the income inequality. In Russia this value was doubled. The relation of income between the richest and poorest 10 % of the population increased only in the first half of the 90s from 3 : 1 to 15 : 1. According to calculations of Åslund (1999) the immense wealth of the new ***oligarchs*** in Russia comes mainly from three sources: first from the purchase of metals or petroleum at low, state controlled prices in Russia and the sale to foreigners at high world market prices; second from the access to cheap loans from the Russian central bank with negative real interests; third from the import of subsidised food that was sold at high prices on the home market (Tillack 2000).

Middle East Europe. The ***Visegrad-countries*** are part of the middle-east European transformation countries. It must be stressed that parts of the transformation were already initiated before the collapse of the Soviet Union. Even when they were bound to the USSR by different alliances, they developed after the open protest was hit back an own profile in political, economical and social subject areas. In Poland there has not been a centrally planned economy since 1981. The state-owned enterprises manage themselves (Süssmuth 1998) and the foundation of small and medium-sized companies was possible. Therefore already before the watershed multitude private companies existed. Since 1980 a socio-ethical dissent was tolerated in Poland, a political opposition and cultural oriented groupings could be established. There were international relations outside the Warsaw Pact and a public reform dialogue in Hungary as well since the 70s (Hodenius & Schmidt 1996). This development influenced with that the starting position of the transformation.

Above all the economical development of the four countries showed a positive tendency; this in spite of different transformation strategies (Süssmuth 1998). Above all in Poland the economy recovered faster by mainly the strong private sector as driving power (Hodenius & Schmidt 1996). Already in 1997 Poland and Slovakia exceeded the income level of 1991.

But there were also problems in Poland. Medium-sized companies are missing almost completely in the economic structure, there are either privatised large concerns or small private companies that are often connected with the illegal economy (Süssmuth 1998). The situation in Hungary is similar. The illegal economy penetrated after the watershed all private economical sectors (Hodenius & Schmidt 1996). In Czech Republic problems were named that are connected above all with the privatisation: no change of ownership and restructuring by privatisation, low efficiency of the bank system, obscure money market, low productivity of the economy at highly increased real income as well as administrative deficiencies and insufficient administration of justice.

Former Yugoslavia. In case of the former Yugoslavia the transformation processes had revived long repressed conflicts. The problem afflicted present and the uncertain future prospects led to a return to a „glorious" nationally characterised past (Hodenius & Schmidt 1996). This trend was shared with the policy and was expressed e.g. in the change of the communist party from internationalism to an ideology of militant nationalism (Süssmuth 1998).

Additional economic problems in the succession states are the consequence. Because an only nationalistically characterised transformation in the age of cross-border economic processes involves big risks. The privatisation is furthermore impeded, because there was no state property in Yugoslavia but instead a company of owners. Besides for the large concerns no investors were found (Weber 2002). Altogether it can be assessed that the wars in the 90s threw back the countries of the former Yugoslavia in all life spheres to a low level of transformation development. A comparison with other countries only at the example of economic characteristics is because of that not sensible.

Southeast Europe. In Romania and Bulgaria the transformation process was characterised equally by missing political continuity. After no short-term success became apparent, the Presidents as only scapegoat were each dismissed and with that the preservation of power for the governing party

secured. Taking advantage of the unstable situation the former communist parties got big political weight. As consequence above all the speed of the economic transformation slowed down (Süssmuth 1998).

In Bulgaria the privatisation was carried out in several dispossession periods. At the same time different laws and dispossession methods were used. The breaking up of these conditions is regarded as the main obstacle of a quick privatisation (Strobel 1993).

Transformation processes in rural areas

In contrast to the numerous publications about economic or political aspects of the system transformation agriculture as well as rural and peripheral regions are so far hardly subject of the transformation studies (Hodenius & Schmidt 1996; Weber 2002).

Details about the privatisation and reforming of agriculture in Bulgaria show that in this connection it is about a complex construction. The governmental plans in 1992 concerning the agricultural reform set the following main focus:

- debt relief for the state cooperatives, private cooperatives and agricultural companies by a state assumption of debt;
- debt relief for stockbreeding cooperatives;
- bank support for cooperatives in the agricultural sector;
- state takeover of currency loans in the agricultural sector;
- suspension of amortisation of loans and payment of interest for private farmers over a period of three years;
- state loan subsidies for foundation of private cooperatives or agricultural companies over a period of five years;
- short-term bridging loans with a period of one month;
- short-term and quick loan aid for farmers to purchase e.g. seeds, fertiliser for a short-term maintenance of production;
- subordination of the overall programme for support within the frame of the state foundation for „reconstruction and development".

But in the example of Bulgaria also the problems of agricultural transformation become clear. Several dispossession waves with different legal basis make the return of the privatised land more difficult. Furthermore there were hardly land registers to clarify the property situation. Half-hearted reforms and opposition at the implementation delayed the process of the land reform, so that the execution of the privatisation could be expected only after 20 years. But a high unemployment rate in agriculture of about 70 % in 1992/1993 proves that there is need for action for fast reforms at the beginning of the transformation (Strobel 1993). A general problem of agriculture inside a market economy is the risk that without trading restrictions it is degraded to a pure exporter without aspects of value added and sustainable development potentials (Hodenius & Schmidt 1996). Currently the main problems of agriculture consist of the loss of the markets in East Europe, the export restrictions to the West and the missing of investors to carry out the necessary modernisation.

Special Problems of Transformation in the Ukraine

Y. Stadnytskyi and R. Nobis

Abstract / Анотація

Окремо представляється Україна. Тут також спочатку спеціально даються характеристики, які повинні зробити більш виразними вихідні позиції до перетворень. Три головні сфери – політика, економіка і суспільство – представляються у відношенні до трансформації, при чому в економіці детальніше досліджуються теми приватизації і тіньової економіки. Порівняння економічних і соціальних даних показує, що Україна у розвитку трансформаційних процесів відстає від усіх інших країн. Однак ліпші економічні показники недавнього минулого можуть перевернути цю тенденцію.

Ethnic, historical, linguistic and religious characteristics

In Ukraine, any formal state sovereignty was missing which could set a limit to the communist pressure of the Soviet regime and could force from it definite sectors of autonomy in the society. Besides, the Russian factor in Ukraine was intensified by the mass immigration of Russians. The Sovietising of Ukraine in the 60s to 80s left some specific Ukrainian elements, but erased all Ukrainian events unpleasant for the Moscow centralism. Its effects were showing even in 1994 in a survey, when 45 % of the inhabitants of Donetsk named themselves as "Soviet citizen". The effects of the attempt, to create a "Soviet nation", will probably continue in Ukraine, but in the long term much older political, religious and cultural differences between the single regions than their degree of Sovietising will dominate (Hryzak 2002).

One of the consequences of the Ukrainian history is its linguistic division. The linguistic usage is correlated to the political orientation (Simon 2002). According to the census of 1989 about 73 % of the population were Ukrainians, 22 % Russians and 5 % other national minorities. After an investigation (1994), which was aimed at the linguistic usage in everyday life, the number of the Ukrainian-speaking Ukrainians equalled 40 %, the Russian-speaking Ukrainians 33–34 % and the Russian-speaking Russians 19–20 %. About 80 % of the Russians in Ukraine are living in the eight southern and eastern Oblasts. In Kyiv the share of Russians accounts for 20 %, it is constantly decreasing to the West. Only in the Crimea the Russians have the majority (Haran 2002).

The four regions of Ukraine are characterised as follows (Kuzio 1997):

a. In the West the Ukrainian-speaking population dominates, in which the rural population is nationally conscious and comparatively politically active
b. The Ukrainian East is highly urbanised and predominantly inhabited by a Russian-speaking population
c. The centre of Ukraine shows a rather high share of Ukrainian-speaking inhabitants in the cities and villages, in which the villagers are politically not active
d. For the Ukrainian South Russian-speaking cities as well as political passive Ukrainian villages are characteristic.

The linguistic division of Ukraine burdens according to Simon (2002) the formation of the state and nation, but also hinders extremists as well as forced administrative decisions, because no Ukrainian government can seriously strive for a mono-ethnic state.

A historical consequence and characteristic of Ukraine is also the heterogeneity of the religions. Not only the three branches of Christianity (Orthodoxy, Catholicism, Protestantism) can be found, but within the branches also different churches. Altogether 60–65 % of the population call themselves devout, from them about 80 % in the West, about 50 % in the East. 30 % of the population are regarded as non-religious out of principle. The largest Christian church is the Ukrainian Orthodox Church (Moscow patriarchy), followed by the Ukrainian Greek-Catholic church (prohibited 1946–1989), the 1921 founded Autocephalous Ukrainian Orthodox Church, which was prohibited as well and survived in exile, and the 1992 founded Ukrainian Orthodox Church of the Kyiv patriarchy. Conflicts exist especially between the four churches of the Byzantine tradition. The striving of the believers for democracy at the end of the 80s was in its nature more anti-communist than pro-democratic. Democracy was accepted, as long as it supports the efforts of the believers, to guarantee their church a free development. But as soon as this principle was also granted to the rival churches, even the creation and the growth of sects was allowed as well as with ongoing development the principles of pluralism and the secular nature of the state were supported, the sympathy for democracy decreased. In this respect the Ukrainian churches have contributed only comparatively little to the democratisation of the country. Especially the idea of the human rights is understood from the believers of the Eastern churches as a western and much too liberal, Protestant idea. The old tradition of subordination of the church under a dominant state is still very strong and cut down the social function of the church. Hierarchy and clergy of the orthodox church under Moscow patriarchy still stand for the renewal of the USSR, call the state independence of Ukraine as "tragic mistake" and support the breaking off of the partnership with the West, NATO and EU. However the orthodox with Autocephalous status plead for the state independence, and confess above all to right-winged, even extreme right-winged, structures. The same applies for the Greek Catholics (Marynovic 2002).

The different cultural characters in Ukraine, where the link between the Latin West Europe and the orthodox East Europe is located, are also expressed in differing economic systems as well as ways of thinking and of behaving, as their consequence the creation of an all-Ukrainian civil society is so far to a great extent ceased (Braun 2005).

Policy

The view of Ukraine to the future direction of the country is subject to clear fluctuations in the course of the last decade. In 1991 56 % of the population declared themselves in favour of a "west turn" of their country, 1996 only 49 %. In the same period the share of opponents of this trend increased from 12 to 30 %. The share of Ukrainians, who pleaded for the strengthening of relations of their country to western countries, decreased from 34 % in 1992 to 12 % in 1996. However, the share of population, who stood for the strengthening of relations to the ***CIS,*** remained in this period with about one third constant (Simon 2002). More recently, in 2000 published poll results showed that the share of "convinced Communists" in Ukraine increased since the middle of the 90s from 10 to 20 % (Hryzak 2002).

The loss of popularity for the democracy in Ukraine can be put down to the incompetence of the state, to offer sufficient economic and social achievements. Many Ukrainians have the feeling that they have been betrayed. Though many underestimated the problems caused by a fourfold transition (democratisation, introduction of market economy, establishment of government and nation foundation). In addition the Western interest, to help Ukraine, was overestimated. In fact the West looked at Ukraine in the first years only as

the remains of Russia. The partnership started in 1994 with the Ukrainian abandonment of nuclear weapons and the western willingness, to support Ukraine financially and politically (Kuzio 1997).

Of significance for the transformation is also the sequence of the single reform steps. During the period of office of Kravchuk and the first term of office of Kuchma the economic reforms had no high priority. According to Åslund (1999) the initial mistake of Ukraine was that after the declaration of independence the policy in Ukraine concentrated their whole power only on the creation of a nation in a political sense. In contrast to Estonia and Latvia, where the economic reforms were regarded as integral element of the national rebuilding, in Ukraine both processes were considered to be apart from each other. In many fields of society and economy reforms were delayed (Simon 2002). In Ukraine the transformation started with the first privatisation regulations in March 1992, followed by a price liberalisation in October 1992, the first stabilising measures in November 1994 and the setting of the constitution in June 1996. Therefore the transformation with this unusual sequence was dragged on for more than four years. Yet the transformation progress is up to now very limited. A comparatively radical programme for reforms was started in autumn 1994, but already soon afterwards, to ease the "pain of transition", a special Ukrainian way was started, a "third way" between capitalism and communism, that should connect social democracy and national protectionism of the state producers. The result was a stagnating reform process – first in the economy, later also in policy. It conserved the old structures, hindered the social change, repressed constructive developments in policy and smothered the formation of a civil society. Ukraine was moving during this time neither forwards to a democracy – like the Baltic States – nor backwards in the old totalitarianism – like Belarus (Kuzio 1997).

According to Kuzio four factors are against a quick turning away of Ukraine from the third way and turning to a democratic community of western character:

a. the position of power of the former top-ranking officials and now ruling oligarchic level, who are only interested in the absorption of property and the resale of goods abroad;
b. the fear for the loss of the state. This fear is founded on the past experience, existing inner tensions and the potential Russian threat. It leads to a corporate, i.e. consent policy and hinders the pluralism;
c. the passivity of the citizen between the elections. Ukraine is a typical delegated democracy. The democratic legitimacy is used, to carry out and to justify the authoritarian corporate policy;
d. the over-centralisation of the state as legacy of the Soviet system as well as the fear of Ukraine, to lose its independence by a decay of the country. But over-centralisation leads to block political activities on the low level and to weaken the public interest in policy.

Economy

Concerning the economic sector Ukraine started with considerable handicaps in the transformation process. The Soviet financial transfers were diverted after the reconstruction of the economy (since the beginning of the 60s), and the funds for the Ukrainian coal, iron and steel industry were reduced. After that, Ukraine specialised in the frame of labour division within the Soviet Union on the intermediate production, in which the production cycles mostly ended outside Ukraine, but the economy of Ukraine was dependent on many deliveries of raw materials. Beside that the armaments industry was oversized and the machine-building industry was tailor-made for the needs of the Soviet Union (Braun 2005; Burakovskij 2002).

To that the misjudgement was added that the independent Ukraine has an enormous economic potential. But the Ukrainian mineral resources could hardly be mined competitively at World market prices. The ore deposits are just of low quality and can only be developed with high expenses (🕮 *The Natural Potential and Problems of Sustain-*

able Development of the Carpathian Region). Only one third of the Ukrainian coal mines can be conducted economically. The large steel enterprises – Ukraine was worldwide on 4th position – belong to a branch of industry with considerable overcapacities and structural decline. The steel production in Ukraine is too expensive (the prices for gas as energy source of the steel production strongly increased) and therefore the prices are not competitive on the world market or rather, if the steel is sold there to the usual price, there is no profit. It is rather correct, that the Ukrainian economy, in which the heavy industry makes up 70 % of the total economy, belongs today to the most energy-intensive national economies in Europe and the energy consumption of Ukraine, compared with the gross domestic product (GDP), to the highest in the world. The supply of energy could not be secured with the level of waste common since Soviet times. Gas importers and nuclear lobby are against drastic reforms, many energy consumers do not pay at all or delayed and the state, debtor itself, has no resources, to prevent this (Piehl 2005).

Pleines (2002) showed at the example of the energy sector the problems of the Ukrainian economic reforms:

- the low efficiency as well as raw material and energy intensity of the production processes.
- the above all in the last years increased economic dependency on Russia with high import debts. As countermeasures remain high transit fees and theft of gas, because the Russian gas pipelines run through the country. Since 2001 the power supply systems of both countries are "reunited".
- the market distortions by state regulation of prices and market access that leads to rent-seeking and corruption. The debts of Ukrainian consumers for energy supply amounted in spring 2000 2.5 billion €. Loss-making companies were maintained, potential foreign investors scared off. There are three reasons for the latter: On the one hand they have as outsiders no "special relations" to the state authorities and they are often discriminated there by their Ukrainian competitors, on the other hand many Ukrainian companies reject a cooperation with foreigners, because they have to disclose and question then their own business methods. Besides many Ukrainian politicians fear a "sell-out" of the "for the national economic security" central energy sector.
- the political set targets, to whom the economic reforms often fell victim.

As still unsolved structural problems of the Ukrainian economy were named elsewhere (Fritz 2001):

- the agrarian crisis, which still exists in spite of the excellent soils;
- the restructuring of the economy. Instead of restructuring the energy-intensive to labour and know-how-intensive industries, Ukraine became dependent on the energy-intensive metal-working sector, which is subsidised;
- the privatisation of important companies at which foreign investors showed little interest for mentioned reasons;
- the mutual indebtedness of the companies makes sure that also true profitable companies can hardly survive in Ukraine.

A characteristic of the economic transformation in Ukraine is the continuous recession. Thus the industry production decreased highly and amounted in 1999 only 26.2 % of the value in 1990. Along with it went a worsening of the branch structure. Unemployment, absolute as well as the share of the economically active population, showed in this period a clear increase and the number of open jobs a highly decreasing tendency. In 2004 unemployment amounted officially 5 %, estimated 11 %, with a common black economy (Burakovskij 2002). In the 90s Ukraine could as the only transformation country in Middle and East Europe (with the exception of the former Yugoslavia in a state of civil war) obtain in no year a positive economic growth, but had rather to cope with a considerable economic decline. 1999 the GDP of Ukraine amounted only 40 % of the GDP in 1990. Only in the current decade a noticeable growth of the real GDP can be recorded: 12.0 % in 2001, 8.0 % in 2002, 5.2 % in 2003. Nevertheless the GDP per capita added up in 2003 to only 826 € and the GDP 3.40 % of the average of EU-15 (Piehl 2005).

It is above all the granting of state guarantees for foreign loans to companies that contradict to the principles of profitability. But the list of the top priority branches is more past than future-oriented. The companies that receive these loans escape from the pressure of the market. That is why the sureties are in many cases nothing else than subsidies. For 85–90 % of the awarded guarantees in the period 1992–1999 amounting 830 million € the state had to vouch for, that means it had discharged loans for the companies (Lunina 2001; Vincentz 2002).

It is also the restraint of foreign investors, which have a slowing down effect on a quick transformation. Although the inflow of foreign direct investments increased highly until 2000, Ukraine showed still one of the lowest values of the transformation countries with 70 € per head (Becker & Dutka 2002). While the foreign investments amounted in 1999 1.57 % of the Ukrainian GDP, in 2003 they increased only to 2.63 %. In Middle and East European comparison Ukraine brought up the rear at the per capita calculation of the direct investments with 98 € together with Tajikistan, Uzbekistan and Belarus. As reasons for the fact that western investors prefer other countries of Middle and East Europe, above all legal uncertainty, corruption, complicated laws, bureaucracy as well as the insufficient liberalisation and deregulation were quoted (Fritz 2001; Piehl 2005). More of the funds are invested in the food industry and trade (16 % each), machine-building industry (9 %) and finances (8 %).

Like the positive characteristics since 2001 show, the difficult ***socio-economical*** transformations lead slowly to a stabilisation and growth in Ukraine. But the sustainability has to be proven in the long term. Besides it has to be considered that the growth rates started from a very low level and that the reason for the low inflation is the missing spending power due to the low income. In addition internal structural problems like high (hidden) unemployment are still existing (Piehl 2005).

Privatisation. Also the privatisation as first transformation measure in Ukraine made only slow progress. In its first stage (1992–1994) the staff received privileges at leasing or purchase of the state companies. The way of allocation made sure that there were many small shares. Result was an insufficient control of the management that opened up the possibility to former functionaries and directors, to secure themselves as manager, later as owner a controlling position in the company. The directors as winner of the transition wish neither the return to communism nor a new political awakening. To them the transformation has ended. For that reason the reforms of the economic and social sector in Ukraine are stopped halfway (Simon 2002). The concentration of the property for the attention of directors is also characteristic for other former Soviet Republics, but in Ukraine it is particularly distinct. This process was executed above all at the expense of the state, but also external national investors and external international investors, whose share on property in 1997 amounted only 0.9 % and was with that clearly lower than in Kazakhstan (6.8 %), Russia (3.8 %), Kyrgyz Republic (2.3 %) and Moldovia (2.1 %) at the same time (Burakovskij 2002).

In the second stage (1995–1998) stocks and shares were issued to the wide population with the goal, to win them for the purchase of shares of large and medium companies (voucher-method, mass privatisation). Though this handing over was not connected with investments, but virtually a non compensatory transference of state property into private property. But many companies proved to be inefficient in management or could not be privatised at all, so that the old and anti-reform managements remained in office.

The third stage started 1999 in the form of capital privatisation for the most attractive companies. Though the buyer has also to take over the debts, their attractiveness was reduced and interested parties were kept from the purchase (Braun 2005; Burakovskij 2002). The capital privatisation of state property is a rather dynamic process in Ukraine. With every year new ***privatisation*** programmes are launched. The previous valid and obsolete decrees were replaced by new laws. However a lot of large privatisation projects were implemented not comprehensibly with the creation of preferential conditions for certain financial

groups and the underrating of the objects. This led on the one hand to discontent of the society and left on the other hand reasons for the judicial revision of privatisation results. From the illegal actions in the course of the large privatisation the international image of Ukraine suffered at last.

Until the present day the privatisation in Ukraine is fiscally orientated. This opens the opportunity to the state, to solve many social problems (e.g. paying out of pensions, income support for the poorest, payment of the employees in budget institutions), but ensures no investments for companies that requires such.

A serious handicap for Ukraine is also those facts, which were accompanied by the privatisation: besides corruption, rent-seeking and state capture also profit-skimming, illegal privatisation, tunnelling (infiltration of the rights of the minority owners) and looting of the companies. First the diversion of property and profit from state companies into private pockets was dominating, e.g. by foundation of private sale companies by manager, who sold products of the company on their own account. Later on the activities were shifted to an as inexpensive as possible takeover of the companies. An indirect privatisation could also emerge from the looting of the companies. At illegal privatisations e.g. property was exchanged against debts under very reasonable terms for the creditor. Also bankruptcies were used for inexpensive company takeovers. Minority shareholders were done out of their property, by holding shareholders' meeting abroad, flight of capital was normal (Hoffmann & Vincentz 2002).

The black economy. An important element of the Ukrainian present is the black economy i.e. the economic activity, which is not included in the official statistics and which is not contributing to the gross domestic product (Tatsiy 2001). During the 1960s–1980s this industrial sector made 20 % of the national income in the USSR and increased further on, because its development was favoured by the intensifying crisis manifestations of the Soviet society. After the collapse of the Soviet Union the increase of the ***black economy*** in Ukraine was accelerated even stronger, it embraces almost all branches of industry (Riabchenko 1999). After surveys and indirect methods like the electricity and cash formulation according to Becker & Dutka (2002) the volume of the black economy is currently estimated at at least half of the gross domestic product of Ukraine, about 40 % of all workers receive their income in one or another way from the black economy (compared to: Slovakia, Czech Republic, Poland, Estonia 5–13 %; Russia 41.6 %; Georgia, Azerbaijan 50–60 % (Havrylyshyn et al. 1999).

The smuggling of goods is the dominating element of the black economy, it makes possible, to avoid customs duties and to transfer funds to accounts abroad (Bazyliuk & Kovalenko 1998). The smuggling is closely connected with e.g. the corruption in administrational and legal organs, and bank structures. This causes losses in the national economy und disturbs the existing system of laws in the area of foreign trade.

The bad payment in the ministries and in parliament opens up chances of bribery for the ***oligarchs.*** Campaigns of checking for corruption only uncovered cases of bribery in subordinate authorities (tax, customs duty, police) (Piehl 2005). In the latest TI-listing (Transparency International: Corruption Perceptions Index 2005) Ukraine can be found on 107th position of 160 examined countries. This is a position that stands for common corruption, but describes a clear improvement compared to the ranking from the previous year (122nd position of 146 countries) where apart from two Caucasus republics Ukraine was the most corrupt country in Europe (compared to 2004: 1. Island, 2. Finland, 16. Germany, 70. Poland, 126. Russia).

The bureaucracy supports the corruption. Thus the state building committee demanded licenses for 845 different construction works, although only 29 were necessary according to the law. Private employers spent yearly € 30,900 on average for bribe and protection money, managers spent 40 % of their working time at officials with negotiations about licenses and taxes. For an installation of a phone connection a bribe of € 1,050, for the visit of a tax inspector € 105 had to be paid (Lewschin 2000).

The spreading of the black economy leads to negative consequences e.g. reduction of the revenues of the national and local budgets, decrease of the investments in the national economy and draining away of capital abroad, unfair competition or its illegal restriction, irregular ***income,*** criminalisation of the society.

The main reasons for the alarming growth of the black economy are (Yermoshenko 1999):

- high tax pressure and frequent changes of the tax laws;
- excessive regulation of the economy on the part of the state;
- inefficient pricing policy;
- corruption of officials, who are in charge of large legal power for the administrative regulation;
- missing of a deep analysis of forms and methods of black economy, their control mechanisms;
- immunity from prosecution for criminal structures, integration of organised crime in the economy, passive agreement of the state;
- missing protection of citizens and companies against criminal organisations;
- missing of an investment alternative outside the black economy.

The corruption and mutual protection of the civil service with decision-making powers lead to a "mafia" system of society (e.g. weakening of the awareness of wrongdoing), and to decisions, which are not lined up to the public welfare and to a dangerous infiltration of the confidence in the state power. According to estimations of scientists corrupt conditions exist at about 40 % of the self-employed and nearly 90 % of the commercial structures. More than 60 % the income of a medium official, who occupies an influential position, comes from bribe money. The bloom of corruption in combination with the bad prediction of the amount and efficiency of bribery reduces the investments in the gross domestic product. But, most dangerous for the state is the probability that the force of competition of the black economy, with its high profits, will weaken the legal economy even more (Popovych 1998).

Socio-cultural sector

The transformation of the society is a special process showing own structures, development tendencies and control mechanisms. Ukraine belongs to the countries, where the transformation takes place according to the democratic type (Rukomeda 2002).

The removal of travel restrictions became one of the most important results of democratisation. The goal of most traveling Ukrainians however was not ***tourism,*** but work for an increase of income. Economic problems of the transition period, unemployment and shortened working hours, low income and delayed paying out of wages and pensions forced many people, to look for a job abroad.

According to Piehl (2005) 5 millions Ukrainians work traditionally in Russia and for some years 1.5–3 millions in Western Europe as seasonal worker, home help and in the building and construction trade, almost exclusively without authorisation, in which 600,000 alone come from the Lviv region. The travels abroad increased a lot and became a typical source of income for many Ukrainian families. For that reason they have a great socio-political meaning (Ivashko & Ben 2003). Large amounts of money that flow in from foreign workers support the development of small business and speed up the formation of a middle class. The work migration is in addition school for business and conduct on the market. The easing on the Ukrainian labour market belongs to the most important positive effects of the ***work migration.***

However the work migration has also negative consequences. The increase of the money supply is causing price increase, cheap goods imported from "commuter trader" compete with the goods of local manufacturers. The money of foreign workers oriented towards consumption was only used very limited for investments or loans. The influence of foreign funds on the development of the small business is extremely low in connection with tax pressure, lack of cheap loans, complicated procedure of registration of a company and

missing faith to the prospects of small business. The foreign work migration can cause in single lines of production and regions a deficit of work force. It leads in addition to a loss of qualified experts. The migration of young people has negative demographic consequences like destruction of family structures or the unfavourable development of the ***birth rate*** (🕮 *Social and Demographical Aspects in Rural Areas of Carpathians and Precarpathians*). An even more complicated problem is the ***education*** of children of foreign workers remaining behind in Ukraine.

One of the most acute problems in Ukraine is the low ***living standard*** of the predominant part of the population. The structural factor in the distribution of income plays actually the decisive part in the satisfaction of needs. If this problem remains unsolved, the social differences in the living standard of the population will be deepened and the possibility, to secure a stable socio-demographic development, limited (Fritz 2001). Especially for poor sections of the population the decrease of the food consumption to 35–65 % of the average is distinct, connected with a worsening of the supply infrastructure and the quality as well as the assortment. The share of single classes of society to the Ukrainian consumption market is described in Tab. 1.

Because of the steady struggle for the securing of everyday needs large parts of the Ukrainian society do not support the community, but face it passively (Simon 2002). Also, economically independent middle classes could only be initially established. It currently accounts for hardly more than 10 % of the population (Piehl 2005).

The civil society, i.e. the public space between state and private sphere, is today more established in those former communist countries, which are in charge of a greater state authority and national integration (Poland, Hungary). For societies however, which emerged from the former Soviet Union, it was in comparison much more difficult. In such countries, in which a civil society never existed or the memory of it is extinct for a long time, it must start over again. Among them is also Ukraine, where the civil society (but the state as well) is weak. But without state authority and national integration it is improbable, to form a strong civil society that could help, to support the society in the democratisation and the development of a market economy. For this numerous elements like the value communion, responsible elites, trust in the society, a whole country embracing national identity and a functioning state are missing. An exception represents only Western Ukraine, where the memory of a civil society at the times of the Austro-Hungarian Empire is not yet extinct (Kuzio 2002).

Tab. 1: The share of single classes of society to the consumption market in 2001, %

characteristic	classes of society		
	poor	medium supply	rich
share of population	47	38	15
share in the purchase of goods:			
– food	38	43	20
– other consumer goods	36	41	23
average share to the consumption market	37	41.5	21.5

Calculated with the: expenses and income of the households in Ukraine in 2001 (Derzhkomitet Statystyky Ukrayny 2002)

Comparison of Ukraine with other *transformation countries*

The annual index of the human development (HDI) of the UNDP accumulate in a quantitative parameter three most important components life expectancy, education as well as the per capita GDP after the mint par of exchange (relation of prices for the "basket" consists of some hundred goods and services). The HDI-value has a relative size for every country (from close to 1 in developed countries to close to 0 in developing countries) (Revenko 2004).

In Tab. 2 the HDI-values for 18 countries of the world are shown. For orientation the table contains besides Ukraine all neighbouring countries, three countries occupying first positions, countries listed in the respective categories on last position, and four largest countries of Asia, Africa and Latin America. According to the data published in the UNDP-report 1999 Ukraine is listed on 74th position of 162 countries and belongs to the countries with average HDI-position.

Ukraine exceeds the world average only at the accumulated value by 3.6 % and the life expectancy. But if it is about the real GDP, after which the standard of living of the population is determined, the Ukrainian value makes up only half of the average. Better developed is the education parameter with 0.92 against 0.74 in the world. The world average of the life expectancy was 66.7 years in 1999. Ukraine lightly exceeds the average. For orientation it must be noticed that in 36 coun-

Tab. 2: Characterisation of Ukraine and some other countries according to the index of human development (HDI), 1999

countries and their position after HDI	accumulated index of human development	life expectancy (years)	ability of reading and writing (from 15 years, %)	education (%)	per-head-GDP (€)	life expectancy index	education index	GDP-index
1. Norway	0.939	78.4	(99)	97	23,694	0.89	0.98	0.94
2. Australia	0.936	78.8	(99)	116	20,478	0.90	0.99	0.92
3. Canada	0.936	78.7	(99)	97	21,876	0.89	0.98	0.93
6. USA	0.934	76.8	(99)	95	26,560	0.86	0.98	0.96
35. Slovakia	0.831	73.1	(99)	76	8,826	0.80	0.91	0.78
36. Hungary	0.829	71.1	99.3	81	9,525	0.77	0.93	0.79
38. Poland	0.828	73.1	99.7	84	7,042	0.80	0.94	0.74
53. Belarus	0.782	68.5	99.5	77	5,730	0.73	0.92	0.71
55. Russia	0.775	66.1	99.5	78	6,228	0.69	0.92	0.72
58. Romania	0.772	69.8	98.0	69	5,034	0.75	0.88	0.68
69. Brazil	0.750	67.5	84.9	80	5,864	0.71	0.83	0.71
74. Ukraine	0.742	68.1	99.6	77	2,882	0.72	0.92	0.59
82. Turkey	0.735	69.5	84.6	62	5,317	0.74	0.77	0.69
87. China	0.718	70.2	83.5	73	3,014	0.75	0.80	0.60
98. Moldavia	0.699	66.6	98.7	72	1,698	0.69	0.90	0.50
115. India	0.571	62.9	56.6	56	1,873	0.63	0.56	0.52
136. Nigeria	0.455	51.5	62.6	45	711	0.44	0.57	0.36
162. Sierra Leone	0.258	38.3	32.0	27	373	0.22	0.30	0.25
developing countries	0.647	64.5	72.9	61	2,942	0.66	0.69	0.59
East Europe and *CIS*	0.777	68.5	98.6	77	5,242	0.73	0.91	0.69
developed countries	0.928	78.0	(99)	94	21,708	0.88	0.97	0.93
world average	0.716	66.7	79.2	65	5,817	0.70	0.74	0.71

Tab. 3: GDP growth of all transformation countries from 1989–1998

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Central and eastern Europe	Albania	154.3	138.9	100	92.8	101.7	111.2	121.2	132.2	122.9	132.8
	Bulgaria	124.6	113.3	100	92.7	91.3	92.9	94.9	84.6	78.6	81.4
	Croatia	136.4	126.7	100	88.3	81.2	86	91.9	97.4	103.7	106.5
	Czech Republic	118.1	116.6	100	96.7	97.3	99.9	106.3	110.3	110.7	108.1
	Macedonia	126.7	113.8	100	92	83.6	82.1	81.1	81.8	83	85.4
	Hungary	117.6	113.5	100	96.9	96.4	99.2	100.7	102.1	106.7	112.2
	Poland	121.6	107.5	100	102.6	106.5	112.1	119.9	127.1	135.7	142.2
	Romania	121.6	114.8	100	91.2	92.6	96.2	103	107	99.6	92.4
	Slovakia	120	117	100	93.5	90	94.5	101	107.6	114.6	119.7
	Slovenia	119.4	109.8	100	94.5	97.2	102.4	106.6	110.3	115.4	119.9
	Average	**126**	**117.2**	**100**	**94.1**	**93.8**	**97.6**	**102.7**	**106**	**107.1**	**110.1**
Baltics	Estonia	–	–	100	78.4	72	70.7	73.7	76.7	84.8	88.2
	Latvia	–	–	100	64.8	54.4	55.5	55.7	57.5	61.3	63.6
	Lithuania	–	–	100	78.7	66	59.5	61.5	64.3	69	72.6
	Average	**–**	**–**	**100**	**74**	**64.1**	**61.9**	**63.6**	**66.2**	**71.7**	**74.8**
Commonwealth of Independent States (*CIS*)	Armenia	–	–	100	47.7	40.6	42.8	45.8	48.4	49.9	53.5
	Azerbaijan	–	–	100	77.9	59.9	49.1	43.7	44.2	46.8	51.5
	Belarus	–	–	100	90.4	83.5	73	65.4	67.3	75	81.2
	Georgia	–	–	100	55.2	41.2	36.5	37.4	41.3	45.8	47.2
	Kazakhstan	–	–	100	94.7	86	75.2	69	69.3	70.7	69
	Kyrgyz Republic	–	–	100	86.1	72.8	58.1	55	58.9	64.7	66
	Moldovia	–	–	100	70.3	69.5	47.8	47.1	43.4	44	40.2
	Russia	–	–	100	85.5	78.1	68.2	65.4	63.1	63.7	60.8
	Tajikistan	–	–	100	71	63.2	51.2	44.8	42.9	43.6	45.9
	Turkmenistan	–	–	100	94.7	85	68.9	63.2	58.4	43.2	45.2
	Ukraine	–	–	100	83	71.2	54.9	48.2	43.4	42.1	41.4
	Uzbekistan	–	–	100	89	86.9	83.3	82.5	83.8	85.8	88.7
	Average	**–**	**–**	**100**	**78.8**	**69.8**	**59.1**	**55.6**	**55.4**	**56.3**	**57.5**

Index (1991 = 100); Sources: National authorities and IMF staff estimates

tries (amongst others those, which occupy the 1st to 26th position in the HDI-rating) this value exceeds 75.0 years. Ukraine occupies after life span only the 90th position in the world.

From the HDI-parameters Ukraine has after the per capita GDP the slowest progress. According to the report of 1999 the country has with this characteristic of € 2,900 after the consumption

ability parity only the 96th position (compared to: Luxembourg € 35,640, USA € 26,560, Norway € 23,694). This value averages for developing countries € 2,942.

In 2002 the GDP at market prices per capita amounted € 853 (compared to: Germany € 32,923, Slovenia € 10,951, Czech Republic € 4,745, Russia € 2,714, Romania € 1,376) (statistical annual report 2004 for foreign countries). Tab. 3 shows the GDP growth based on 1991 on comparison of all transformation countries. Ukraine is only undercut in the development until 1998 by Moldavia and shows with that even worse values than ***CIS***-countries, in which no transformation towards a market economy took place. In addition it must be considered that Ukraine has the lowest initial value of all countries even behind Turkmenistan and Tajikistan (Havrylyshyn et al. 1999).

In an overview compiled for the period 1999–2000 for 11 Middle and East European transformation countries excluding the Baltic States, Ukraine landed on the third from last position, only ahead of Belarus and Albania. (Braun 2005).

Conclusions

The transition from communism to democracy in 27 Eastern block countries will take a longer period, as until now could be presumed. Only in seven countries – the three Baltic States, Poland, Hungary, Czech Republic and Slovenia – the process of democratisation did not come to a halt. Ukraine is in this respect in a particularly difficult situation, to carry out not only the ***democratisation*** (a law and order and democratic rules, the protection of fundamental and human rights as well as the protection of minorities) and to introduce and to maintain a functioning ***market economy*** (company and competitive liberty; development of private property; liberalisation of prices, wages, interests; free foreign exchange dealings; free allocation decisions), but at the same time also to create a state and a nation (Kuzio 2002).

Comparing the different strategies the so-called shock therapy proved to be better for the economy (e.g. Czech Republic). If the economic transformation was gradual for certain sectors, the characteristics are bad just there (Poland). At a sheer gradual strategy the economic development is first of all bad. But at both different ways it is also necessary to weigh the psychologically important quick success against the background of the long-term development. Foreign investments triggered by low wage costs causing long-term problems in the structural change, because the necessary increases in income fail to appear (Süssmuth 1998). An important weighting is also the balance of the two mostly opposite aspects social security and economic success (Strobel 1993). The experience has shown that fundamental changes in the initial phase of the transformation were carried out easier, because they were supported by the euphoric population. However, incisions later on caused discontent (Süssmuth 1998).

The balance of the economic characteristics shows that as at the end of the 90s at the GDP only Poland, Slovenia and Slovakia reached again the level of 1989. In the ***CIS***-countries there was no essential recovery after the setback (Eger 2000). Ukraine shows at the end of the 90s even the worst economic data of all transformation countries. Besides the regional characteristics this ranking can also be put back to the strictness of the reforms. But altogether it must be stressed that there is no universal recipe for a successful transformation. For that the past history and the starting point of the countries alone is too different. Furthermore not every negative or positive development can be traced back to the transformation and with rising integration in the world economy its influence is increasing. The complexity and the partly contrary effects of the reforms on the three main fields of the transformation lead us not to expect fast and long-term stable success. Nevertheless in most of the transformation countries there are at least in parts positive developments and success.

Political Development and Current Problems in Ukraine

J. Durkot

Introduction

After the decline of the Soviet Union, Ukraine did establish itself as an independent state, but democratic changes progressed very slowly.

The consolidation of the old elite led to a system of ***oligarchy*** in the second half of the 90s – the consequences were a turning away from democratic reforms, reinforced autocratic tendencies and blossoming corruption. Regional politics has been shaped by the centralistic authoritarianism as well – up to now, the Ukrainian regions, being altogether weak, have neither had competences nor financial opportunities for a steady development. New prospects for a democratic development of the country are opened by the ***"Orange Revolution"***.

From independence to an oligarchic country

The Ukrainian society, having been particularly shaped by the Soviet system, was not developed sufficiently to muster an irreversible turn to democracy in the first years after independence. In the first stage of the unstable balance between national democrats and the post-communist elite under President Kravchuk (1991–1994), the democratic alterations were inconsequent and halfhearted.

The effects of this uncertain policy that finally was Yanukovych's undoing was the outbreak of the economic crisis and the escalation of domestic policy tensions (separatist tendencies on the Crimea). The situation was made even more complicated by the difficult relationship with Russia. The democratic reforms remained incomplete as there was no change of the elite in Ukraine. After Leonid Kuchma's victory in 1994's election, former KP officials under Yanukovych were gradually replaced by the more pragmatic young guard of top-ranking officials. Although some economic reforms were initiated, the democratic alterations were overall stuck and were steadily withdrawn in the second half of the 90s. The Ukrainian constitution of 1996 cemented a centralistic vertical hierarchy with some elements of regional self-government.

Ukraine departed further from democratic standards particularly in President Kuchma's second period of office (1999–2004) towards a country increasingly ruled by an authoritarian government. This development coincided with a different tendency in the Ukrainian society: with the rise of the few finance and economy groups that usually came to their primary prosperity by commodity trade where they knew how to make use of their proximity to politics. Long before, the old post-communist party officials were superseded by them, they were able to increase their wealth by often dubious privatisation, relished a myriad of privileges, preferences, tax alleviation and monopoly licenses and were thereby able to gradually gain control over huge parts of the Ukrainian economy. Observers increasingly spoke of an oligarchic system for which the power of the few financially and economically dominant clans and a merger between economy and politics were typical. Widespread corruption, the lack of an independent jurisdiction, a working separation of powers and independent media are typical of

such a system. Particularly the freedom of press was limited until a more or less open censorship was finally introduced in 2003. With regard to economy, the Ukrainians did increasingly badly in the 90s: the inconsequent structural reforms were not able to stop the continuous fall of the ***gross domestic product*** and the impoverishment of the main social stratum. An extensive reform program was just passed in January under the government of Viktor Yushchenko.

A new trend was caused by a drastic cutback in subventions, a ban of non-monetary payments, the introduction of an ambitious program of ***privatisation*** and the tightening of public finances. The speed under following governments was cut down, but the economic growth continued, although problems cumulated again. During the parliamentary elections in 1998 and 2002, the "party of power" was able to succeed (only a party's influence and its proximity to the president was of importance, party programs were of minor importance), in the end by ever more intense manipulation and election fraud. Although the reform alliance "Nasha Ukraina" of former Prime Viktor Yushchenko had clearly won the election in 2002, the government was able to win most constituencies through pressure, voter purchase, use of the notorious "administrative resource" and wooing away of "independent" candidates and it could form the majority in parliament. However, when the presidential elections took place in 2004, the election forgers went too far, when it came to securing the election triumph for Prime Minister Viktor Yanukovych who was regarded as "designate successor" of President Kuchma. After an extensively manipulated election hundreds of thousands people went out into the streets in many regions of the country on November 22nd. By peaceful mass protests, lasting several weeks and afterwards going down in history as the "Orange Revolution", a repetition of the faked final ballot could be forced into being from which Yushchenko emerged victorious.

Reforms overdue

According to an apt remark of retired German minister of defense, Volker Rühe, the Ukraine under Kuchma has been a European country, but did not have a European face. This new "European face" cannot develop through the simple changeover of power, but only through a takeover of democratic values and rules as well as through reforms – the fight against corruption (🕮 *Special Problems of the Ukrainian Transformation Process*) is a part of that as well as the separation of business and politics, getting rid of old decrepit power structures and the establishment of an independent judiciary and free media are. The first months after the "Orange Revolution" showed that the policy of reform is rather complicated and slow, which means that, today, one can at best recognise some reforms and that uncountable setbacks and mistakes can repeatedly occur.

The governmental crisis of September 2005 showed the tensions among the "Orange Team" and led to the dismissal of Yulia Timoshenko's government. Some fairly close intimates of President Yushchenko had to go because of accusations of corruption.

In the end, not the tensions and interest conflicts between different groupings of the "Orange Coalition" were decisive. The actual reason for the crisis is that until now the separation of economy and politics has not been successful. Although Yushchenko took up the cause of this principle, a fundamental change of the system still failed. Even the separation of office and mandate, required by the Ukrainian constitution, has been ignored by several ministers.

Thus, it was only logical for negative tendencies to increase over the course of time; there have always been rumours about new cases of corruption. More and more experts point out that it is not legitimate to have an office manager of the President who is also a member of the supervisory board both of the Telecom and the savings bank and who coordinates energy policy at the same

time. Society has also disapproved of the rise of "new ***oligarchs***".

On the other hand, the Timoshenko administration had no clear economical agenda. Their attempts, consisting of more and more regulations, caused numerous tensions; they tried to control the prices and, thus, to alleviate the effects of inflation, but they failed. The chaotic struggle against the old ***Oligarchs*** who had acquired their factories during the Kuchma era under dubious circumstances at very low prices (in 2004, Kuchma's son-in-law had bought the smelter "Kryvorishstal" for about € 700 million; when there was a new invitation to tender, it was sold for about € 4 billion on Oct. 24, 2005; 🕮 *Special Problems of the Ukrainian Transformation Process*) scared off serious investors, both domestic and foreign ones. Yulia Timoshenko, whose charms and energy in connection with a fair amount of populism the voters approve of, can be expected to act with determination against illegal businesses and to get rid of the decrepit structures of power; however, she will hardly be capable of carrying out a liberal policy of reforms. Therefore, a conflict with President Yushchenko, who is more of a politician of free-market origins, could not be avoided.

A new start is even more difficult because of the upcoming election campaign and the parliamentary elections which are to follow in March, 2006. Nevertheless, the months in the aftermath of the "Orange Revolution" left some traces both on the country and on the people. Although most Ukrainians had hoped for their country to make a quicker progress, it was certainly not a wasted period of time. The positive changes might still seem weak and not irreversible, but they cannot be ignored: the press enjoying much more freedom, although its influence is still not big enough; the authorities which used to be exploited whilst fighting the political opposition being depoliticised. The most important thing, however, is that there is a much stronger social control in Ukraine today and that the people enjoy more self-confidence than they used to; a development which will leave its mark on the "European face" of Ukraine and the Ukrainians on their way to Europe.

The road to Europe: Declarations and disappointments

Ukraine started a careful approach to the west immediately after it gained its independence. They already signed a partnership and cooperation treaty together with the European Union in June, 1994, which came into effect on March 1, 1998. In February, 1994, Ukraine joined the NATO program "partnerships for peace". In July, 1997, they signed the NATO Charter about the special partnership which stands for a new level of quality in their relations. The Ukrainian foreign policy of the years 1997 and 1998 showed increasingly prowestern features; there were treaties of friendship both with Russia and Romania. In addition to that, Kyiv did more and more articulate its aspirations for a future EU membership. As far as foreign policy was concerned, this was Leonid Kuchma's most successful period.

Ukraine defined integration into "European and Euro-Atlantic structures" as its strategic aim for the first time in 1996. This shift of priorities came as a bit of a surprise: everyone had expected Kuchma, having been elected President in July, 1994, to turn to Russia, for his manifesto included a partnership with Russia which guaranteed him the necessary votes in Eastern Ukraine. However, Kuchma decided to go for a policy of maneuvering in the end. As for its foreign policy, Kyiv's position was slightly shifted: a NATO membership was no longer on the agenda. Firstly, the Ukrainian people had lost their faith in this alliance after the Kosovo war. Secondly, an aspiration for a NATO membership would bring about a collision course with Moscow; obviously, this was to be avoided.

At first, Ukraine followed its course towards EU integration with a higher degree of sustainability, however, the doctrine of a double-track or "multi-vector" foreign policy was soon added. In

this context, Russia was named the most important strategic partner. This double-track policy was especially criticised by supporters of the European idea in Ukraine for showing inconclusiveness and signifying a weak compromise.

After the partnership treaty had come into effect, the dialogue between Ukraine and the European Union has only brought about some declarations but also a number of disappointments. Kyiv was pushing for an association status and wanted to be given the right to join from Brussels. The EU, on the other hand, pointed out the necessity of domestic reforms and insisted on a complete implementation of the partnership treaty before further steps would be taken. Many documents adopted from both sides were hardly more than mere declarations: the "Strategy for Ukraine's European integration", signed by President Kuchma in the summer of 1998, the schedule for an EU membership (according to this schedule, Ukraine was to be ready for a membership in 2011) from 2002, as well as the "joint strategy" adopted at the EU summit in Helsinki in December, 1999.

Amongst European capitals, Kyiv could not find a strategic vision of any development of the relationships with a country which was attached a central (or, at least, important) role in Eastern Europe; according to Ukrainian experts, there was also a significant lack of enthusiasm in Brussels as far as the willingness to cooperate in the field of work was concerned. Projects which seemed economically promising for both sides (like, for instance, the intermediate-range cargo plane Antonov 70) were blocked by European administrations for political reasons. The European Union on the other hand pointed out problems as far as the implementation of the partnership and cooperation treaty was concerned. Not without a reason: there were more and more violations of the regulations from the Ukrainian side.

Ukraine under Kuchma: Little content despite assurances to Europe

During President Kuchma's period of office, Ukraine could not accomplish its "European choice" which had been announced several times. The rhetoric of "European integration" has become an empty phrase, and the gap between the aspirations and the real domestic situation became larger. The contract killing of the dissident journalist Georgiy Gongadze in September, 2000 and the existence of tapes incriminating President Kuchma promoted and accelerated the decline of the country towards authoritarianism (which could hardly have been avoided, anyway). Ukraine's relationship with the European Union was at its lowest, despite all the pro-European rhetoric in Kyiv.

The Ukrainian elites under Kuchma barely understood that the process of rapprochement between Ukraine and Europe demanded higher domestic and social changes than what the decrepit structures of power were ever ready to take. Now one could get the impression that Ukraine does not play by the rules, but that they merely play with them, as Xavier Solana, a representative of the Joint Foreign & Safety Policy, put it very aptly.

"The domestic situation hardly allows a stable and effective foreign policy and weakens Ukraine's position. Its foreign policy has more or less become a hostage of the domestic crises." This was the opinion of experts from the Rasumkov centre for economic and politic research in Kyiv, early in 2003. In 2004, both aims (NATO and EU membership) were removed from Ukraine's foreign affairs doctrine.

The foreign policy makes its mark: The EU rapprochement takes priority

Ukraine achieved fresh opportunities after the "Orange Revolution" and Victor Yushchenko's electoral victory. It is obvious that Yushchenko is a pro-Western democrat who wants to follow a new course of European integration. And an EU membership was indeed made part of the political doctrine as a long-term goal immediately after Yushchenko's victory. Apart from that, Borys Tarasyuk becoming foreign secretary (he had already held this office between 1998 and 2000) was a clear sign of Ukraine's convergence with the EU. They are likely to demand clear prospects from Brussels in the event of their joining. Tarasyuk wants to speed up the EU membership: he expects a clear answer to the question of Ukraine's EU prospects next year and he hopes that an association treaty will be signed by 2009. However, this strategy can bring about both advantages and disadvantages; and it remains to be seen how fast Ukraine will be on target for integration the way they announced it.

The majority of Ukrainian people supports the EU aspirations of their country. In a poll carried out by the Rasumkov centre together with the International institute for Sociology in Kyiv in May, 2005, more than 50 % of all Ukrainians were in favor of an EU membership. 30 %, however, were against it, with 20 % being indecisive. Only 25 % of the interviewees want the NATO membership.

Since the situation in Ukraine has completely changed since the "Orange Revolution", Kyiv as well as Brussels is now in demand. On the one hand, Kyiv has to be careful that the real integration steps and the necessary domestic changes are not replaced by pointless discussions about membership options or even by speculations about a possible date. On the other hand, Brussels has to face the challenge of finding new concepts for a close collaboration with Ukraine. Both sides will now rather follow a policy of small and concrete steps. With regard to this, the abolishment of compulsory visa for EU citizens by Ukraine can be seen as a positive and important sign. Kyiv now expects concessions from the European commission: they want significant facilities for certain groups such as students, scientists, persons engaged in the cultural sector or businessmen. Both sides should be interested in intensifying a mutual exchange which used to be quite difficult because of restrictive visa regulations and bureaucratic obstacles from the EU.

Today, Ukraine's new concept of neighbourhood aims at a much more intensive collaboration, compared to other EU neighbouring countries; with the new agenda, signed on February 21, having been amended by a number of important points. The strategies will have to be redefined and rendered more precisely before the partnership and cooperation treaty ends in 2008.

But a more open EU policy could be relevant even before that: for example, being given the status of a free-market economy, which would already be possible in December, 2005. Kyiv has also declared a NATO membership its aim, although this is not part of the agenda yet. The Ukrainian people are still polarised by the NATO issue. It is particularly rejected by the voters in the east: they still have very vivid foe images from Cold War times. Thus, the issue of the NATO membership has the potential of tightening regional confrontations. This is the reason why some experts are of the opinion that the NATO membership should not be a primary goal of the Ukrainian foreign policy and should not be targeted in the next years.

The rapprochement to Europe does not mean that Ukraine turns its back on Russia. Both countries are dependent on collaborating; however, there are a lot of things to fix in their bilateral relations. Not only did Russia's direct involvement in the presidential elections of 2004 bring about political disgruntlements, but they were neither well received the Ukrainian people. Although Yushchenko has pointed out several times that Ukraine is interested in having good relations with Russia, yet, Kyiv is very likely to set a course on its own in the future and to try and pursue quite a self-confident policy of national interests, despite all dependencies.

It is an open question, whether the Kremlin will be willing to develop new strategies in its foreign policy. The previous policy, having been dictated by geopolitical categories and by thinking in terms of "spheres of influence" as well as having been supported by a hidden or open political and economic pressure, turned out to be counterproductive.

However, there are plenty of areas of conflict between both countries. The energy problem (prices for gas deliveries from Russia and for transit to Western Europe, to name but a few), the deployment of the Russian Black Sea fleet in Sevastopol (the lease agreement ends in 2017), different ideas of the joint economic area or about the regulation of the Transnistria problem, the quarrel about a WTO membership (🕮 *The Future Development of Agriculture in the Western Ukraine: Ukraine Joining the WTO and European Integration*) and about demarcation in the Asov Sea are only part of the difficulties waiting to be solved.

Regional particularities in Ukraine: political and economic developments in Galicia after the independence

The Oblast Lviv belongs geographically to ***Western Ukraine;*** the latter is not, however, a homogenous unit, but consists of four different parts: Galicia, Volyn, Transcarpathians and Bukovina. Lviv, together with two other smaller Oblasts, is located in Galicia, a historical region which had belonged to Poland since the middle of the 14th century; it was given to Austria after its division in 1772 and belonged to Poland again after the collapse of the Austrian empire in the era between the wars. After the Hitler-Stalin pact, Soviet troops invaded Galicia in September, 1939, and after the time of the German occupation during World War II, the area had belonged to the Soviet Union since 1944 (🕮 *Land-use History*).

The historical particularities had a remarkable impact on the mentality and the political tendencies in Galicia. All the traditions of the civil society in connection with their national pride made Lviv a pioneer of civil rights during the late 1980s of the Perestroika era. Here were the origins of the national-democratic movement for Perestroika (Ruch); they stood up for the release of dissidents and the reestablishment of the Greek-Catholic church which had been forbidden by Stalin.

In the end, Galicia, which had had a strong Ukrainian background and which, compared to other regions, had been less Russified and Sovietised, gave new and important impetus to the country's independence, Galicia with its metropolis of Lviv, the latter being the only big town in the whole Western Ukraine with about 800,000 inhabitants, has often been called the "Ukrainian Piedmont" because of this pioneering task both in the political as well as in the cultural field. Lviv and Galicia had to give up this role throughout the 1990s. The reasons for that were mostly domestic developments. On the one hand, Ukraine has turned into a thoroughly centralised state which has also been fixed in the constitution of 1996. The fear of division of the country and separatism respectively led to a restriction of the regional competences. Being the capital, Kyiv gained the central and dominating position in this system. Although Ukrainian regions and communities have the right of self-government (elected mayors, city councils and regional parliaments), they depend politically, economically and financially largely on Kyiv as the centre of power. Governors are appointed by the President, regional administrations are subordinate to the President and his administration. Meanwhile, even Ukrainian politicians had to realise that this model cannot work in a country with such diverse regions.

During the planned administrative reform, the regional competences are to be increased (🕮 *Regional-political Territorial Organisation and Administrative Structures in Ukraine*).

On the other hand, the national democrats whose stronghold had always been in Western

Ukraine and particularly in Galicia lost more and more supporters throughout the country during the 1990s. After the first period of imbalance in the first half of the 1990s, the post-communist elites gained more influence. The division amongst national democrats and the mistakes of their representatives contributed to that. At the beginning, they put more emphasis on national aspects than on democratic ones; thus, the national democrats gambled away many chances in the east which was shaped by Russian influences, although the east had been open to democratic developments (the protests of miners at the end of the 1980s and the beginning of the 1990s, for instance). The position of the national democrats turned weaker in central Ukraine, too. It was Viktor Yushchenko who finally managed to make the democrats powerful again and to shift the main focus in this discussion to general democratic values. At the same time, the large majority for Yushchenko in most Ukrainian regions in the presidential election of 2004 showed that "the West" in Ukraine has remarkably moved towards the east and that Galicia and Lviv can hardly hope for an exceptional role under these circumstances. Another reason for this development was the fact that Lviv and Galicia had neither economically nor politically the importance of the eastern regions which were dominated by heavy industry. The region was additionally weakened by emigration of most of the elite.

In contrast, political preferences in Galicia never changed. The Galician voters tend to vote for different national-conservative parties, including moderate nationalists; parties of liberal background are far from having such a high potential. The voters in Galicia are open to political populism as well, as the high popularity of former Prime Minister Yulia Timoshenko in this area shows. Timoshenko played an important role in the "Orange Revolution". Communists and other left-wing parties, however, never stood a chance in the west where "Anti-Communism" has a long tradition. Today, the extreme nationalist movements are not presentable, although the people had paid attention to them at the beginning of the 1990s when they started numerous activities. The voters from the west with their fixed political ideas could barely be manipulated; a number of recent smear campaigns and information blockage had hardly any impact on the voters' sympathies. Galicia even resisted the increased pressure of authorities during the last years of the Kuchma era. For example, not only were mostly national-democratic politicians voted into parliament in Western Ukraine, the regional and city parliaments in this increasingly authoritarian state even showed a high degree of independence. This led to a number of conflicts with the regional executive branch which was subordinate to the President and the Prime Minister.

The situation was almost the same with the presidential elections, although the people felt it was time for a change at first. However, the Galician voters were often forced to vote for the lesser of two evils. In 1991, Tchornovil, a former dissident and representative of the national democratic forces who was very popular in Galicia, lost to the KP apparatchik Kravchuk. In 1994, the Western Ukrainians already supported Kravchuk (who sold himself as a "moderate nationalist" in the west at that time) with a large majority: he seemed more acceptable to them than the pro-Russian "Red director" Kuchma. In 1999, there was a similar situation. This time, the large majority of voters in Galicia voted for Kuchma, because his opponent was a communist. Only in 2004 could the area vote for their favorite candidate (Yushchenko) again.

During the "Orange Revolution", Galicia proved their important role once more. Although Lviv and Western Ukraine had reacted quickly and resolutely to election frauds, other regions were politically active as well this time: not only the people of Kyiv and Western Ukraine took part in mass demonstrations, but the people from most Ukrainian Oblasts.

Economically, Galicia remains behind the industrial regions in the east. There were no industrial facilities erected here after the 2nd World War, since this was too high a strategic risk for the Soviet Union because of the proximity to the border. The region was dominated by medium businesses and agriculture. During the years of crisis

after the independence, many big factories went bankrupt; others were ruined deliberately in order to drive down the purchase price during the privatisation. Galicia and the whole Ukrainian economy have only been recovering since 2000. The region remains highly agricultural; however, a middle class has remarkably developed during the last couple of years. This meant that there were some significant changes of the social structure amongst the rather conservative and traditional population in a region where the church plays an important role today (in contrast to other Ukrainian regions where several branches of the Orthodoxy are dominant, the Greek-Catholic church is the most important religion in Galicia by far).

There are some large differences in the level of income between each Oblast; the income is especially low in rural areas. For example, Ternopil is one of the poorest regions, even in Galicia; however, Lviv is below the nationwide average as well, although just scarcely (at an average monthly income of about 700 UAH which is approx. € 120; 🕮 *Social and Demographical Aspects in Rural Areas of Carpathians and Precarpathians*).

Nevertheless, these numbers are not very meaningful, since the better part of the Ukrainian economy works hidden; experts think that the hidden economy accounts for about 30 to 40 % of the GDP (🕮 *Special Problems of the Ukrainian Transformation Process*). The migration of workers to Europe has become an important economic factor in this area, too. The guest-workers earn money abroad and send it home, thus supporting their families and investing it in their houses or in setting up their own business (🕮 *Social and Demographical Aspects in Rural Areas of Carpathians and Precarpathians*). As Ukrainian scientists found out, about € 85 million went into the small region of Ternopil alone (with about 1 million inhabitants); at the same time, the state invested merely € 1.7 million in the Oblast.

Despite its relative economic weakness (transport connections, a dense road network, trained employees), Western Ukraine has a comparably good infrastructure and benefits from its location. That is why the region of Lviv always scores well when compared to other Ukrainian Oblasts when it comes to their attractiveness for potential investors. The proximity to the borders not only plays an important role for the people of the small communities who make a living from a large amount of pedestrian cross border daily trade, but also the investors find the area attractive for logistic reasons. For example, the better part of the investments from Poland went to Lviv; by improving the general framework, other foreign investors want to intensify their presence noticeably, too. The field of job processing shows the biggest potential, since Western Ukraine (unlike other Ukrainian regions) shows logistic advantages for western companies which want to move their production facilities abroad for reasons of economy.

Forest Landscapes in Europe

N. Weber

Abstract / Анотація

Кілька століть тому Європа була покрита лісовою рослинністю більше, ніж на 90 %. Завдяки приросту населення і використанню деревини на різні цілі, експлуатація лісів перевищила їх здібність до реґенерації. Розділення лісу і відкритого простору сталося на протязі 19 ст. З цього часу лісові ресурси відновлюються і площа лісів починає збільшуватися знову. Будівельні ліси змінювали колишні гайки та напів-відкриті лісові ландшафти. Збільшувалися площі лісонасаджень з домінуванням одного виду дерев (особливо Picea abies). Сьогодні ліси піддаються багатьом видам ризику (хвороби, буревії, пожежі) що навіть містить в собі можливість зміни лісового ландшафту на регіональному рівні. Стале лісове господарювання прийняте за парадиґму по цілій Європі. В майбутньому ліси будуть залишатися інтеґральним елементом пан-європейського лісового ландшафту. Очікується, що заліснення і природна сукцесія приведуть до зростання лісової площі в Європі приблизно на 5 % на протязі 2000–2200 рр. На вигляд лісового ландшафту буде впливати зміна суспільного попиту (наприклад, нові напрямки у формах лісового відпочинку) та відповідна політика, а також, можливо, негативні зміни клімату. Навіть можливі нові винаходи в системі агролісосфери в Європі.

The history of forest landscapes in Europe

Before human influence changed landscape, Europe was covered with tree vegetation to more than 90 %. But as a growing population in need of resources discovered the multi-faceted applications of wood and timber, forests started to be exploited beyond their capability of regeneration: (1) Without any fossil fuels at hand, charcoal and fuel wood represented the only form of *energy* for the local population. (2) Industry employed *raw materials* such as potash, dyes, sap and resin, barks for tanning as well as fibre and osiers. Digging for quartz and minerals or harvesting for grass represented other widespread practices. (3) ***Forests*** contributed directly and indirectly to local *food production*. Litter raking, lopping of branches and shredding constituted a European type of agroforestry, not to mention special practices of ***shifting cultivation*** and ***forest pasture*** (Glatzel 1999; Küster 1999). The resulting combination of *grazing,* extensive clearcuts, monocultures and intensive harvesting led to heavily degraded forest ecosystems where impoverished soils maintained poor levels of productivity with little plant diversity. During several centuries, this low level has been sustained due to steady biomass exports (Kankaanpää & Carter 2004a).

Forests began to change in appearance according to the market's demand for particular forest products. In response to a rising demand for ***fuel wood*** the share of ***coppice*** forests augmented, favouring tree species mainly composed of hornbeam ***(Carpinus betulus)*** over the use of beech ***(Fagus sylvatica)***. This shift in species was hardly

welcome by users who needed ***timber*** and only the introduction of ***coppice with standards*** as a silvicultural practice providing both fuelwood and construction wood could reduce the conflict. The growing demand for ***timber*** as a construction material for urban housing and the shipping industry also brought along intensified use and ***clear-cuttings*** in ***mountainous forests.*** Thousands of ***spruce*** and ***fir*** trees were transported by rafting on rivers to locations hundreds of kilometres downstream (Küster 1999). Notwithstanding this general development, remarkable differences existed between Romanic and German ***forest landscapes,*** especially in the alpine regions. Romanic landscapes only had a small share of forests with most of them cut down to coppice and providing ***pasture,*** fodder, fuelwood and charcoal. In Germanic parts, forests were not cleared to the same extent. High forests still prevailed and a lot of timber was sold to mines or salt refineries (Bätzing 2005).

At the dawn of the 18th century, in consequence of long-lasting and intensive use of timber and non-wood forest products, the forested areas had reached their lowest level in Europe. At that time, European rulers finally became aware of the economic value forests represented and which they wished to preserve. As a matter of fact, a segregation of forests and open lands emerged during the 19th century: Gradual transitions between dense and open forested areas gave way to strict separation between forest, meadow and field. Forest grazing was prohibited, and borderlines between agricultural land and forests could be drawn on maps. The forests' overall recovery accelerated with the introduction of chemical fertilisers and intensive pastures to ***agriculture,*** the deposition of atmospheric nitrogen from anthropogenic sources enhancing the process (Kankaanpää & Carter 2004a). Even though the above-mentioned measures could halt further degradation to a certain extent, large-scale afforestations in Central Europe became only possible during the second half of the 19th century, when wood had been substituted as a primary resource for industry by coal, brickstones and steel. In addition, wool had partially been replaced by imported cotton, thus facilitating ***afforestation*** of pasture heathland. Mineral manure made higher returns possible, enabling the afforestation of marginal agricultural land: steep slopes; flat soils; dunes; over-exploited wasteland (Küster 1999).

A new type of Central European forest landscapes resulted from this transformation process: closed and high forests, with increasing levels of productivity. In the Mediterranean region, however, forests never recovered to the same extent and the main landscape character is still an open one.

European forests and forest landscapes today

The actual distribution and shape of forests (Fig. 1) in Europe can be characterised by its extraordinary diversity where natural factors (altitude, climate, soils) as well as human influence (historic use, silvicultural techniques, property structures) had their share of impact. Despite this great variety, some general features may serve for a rough description.

Area, increment, stock. According to the most recent assessments (UNECE/FAO 2005) the total area of forest and other wooded land in 38 European countries amounts to 1,120 million ha, with the bulk of this area (905 million ha) being situated in ***CIS*** (Commenwealth of Independent States) countries. Western Europe disposes of 150 million ha and Eastern Europe of 65 million ha forested land. The forest area per capita ratio is considerably high in northern Europe and ***CIS,*** corresponding to 5+ and 2–3 ha respectively. In Western Europe, the average ratio remains at 0.3 ha per capita. But Western Europe has also set a general trend by increasing its growing stock of forests by 91 % (or 7 million m^3 over bark since 1950). The underlying factors for this development may be found in nature and – to a much larger extent –

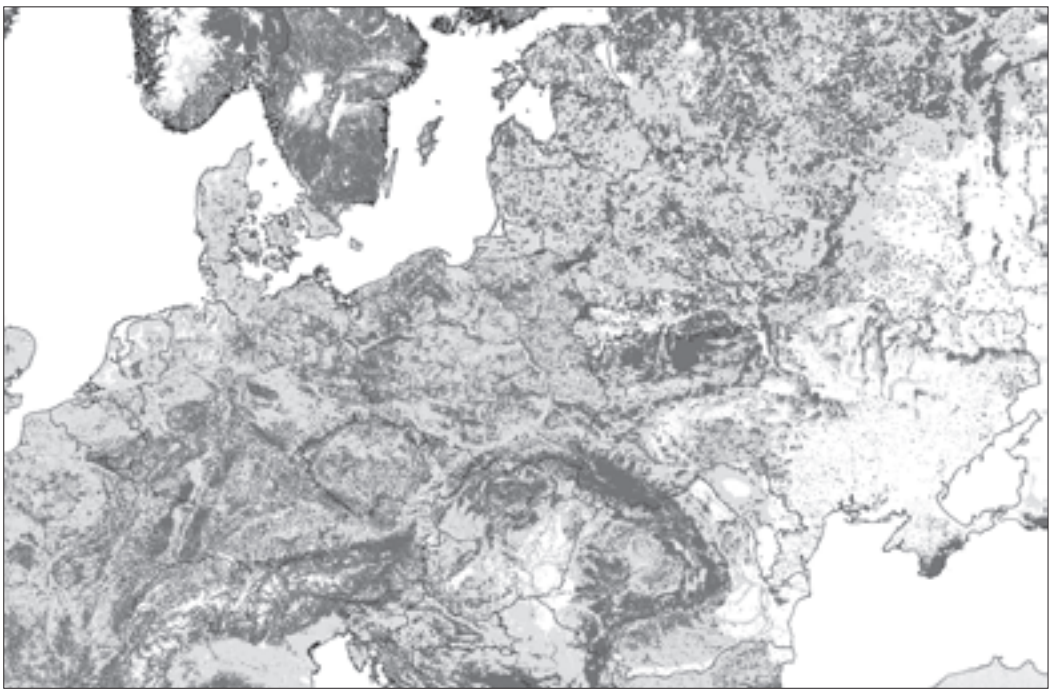


Fig. 1: Current forests (dark grey) and original forests (light grey) in Europe (source: UNEP World Conservation Monitoring Centre, *www.unep-wcmc.org/forest/eu_gap/c.htm*)

in changes related to ***forest management*** practices. The latter correlation is also confirmed by a visible change in the overall landscape: Especially in Belgium and France a large-scale conversion of coppice and coppice with standards has been taken place since the 1970s. The findings of Karjalainen et al. (1999) show that the "unexplained" increase in site productivity on sample plots all over Europe can also be attributed to the fertilising effect of nitrogen immissions.

Tree species composition. In the boreal zone (Russian Federation and the Nordic countries) and in Central Europe (Austria, Germany and Poland) predominantly ***coniferous*** forest landscapes keep on prevailing while mixed and predominantly broadleaved forests are gaining importance in the Nordic countries. Today, about 40 % of Europe's forests are "mixed", reflecting a widely expressed belief that mixed forests provide more ***biodiversity.*** The overall objective of enhanced biodiversity also plays a role when choosing the mode of regeneration within a given area, as ***natural regeneration*** is known to conserve genetic diversity and tends to maintain species composition. In most of the European countries, two-thirds of regeneration in recent years has been natural. Continuous cover systems also tend to maintain genetic diversity. Given suitable site conditions, introduced and fast growing tree species (e.g. ***Pseudotsuga menziesii, Pinus radiata, Eucalyptus***) often were used for afforestation. However, there are no reliable data about the extent to which ***introduced species*** have replaced domestic trees. In total, about 200,000 ha of introduced species are planted annually, corresponding to 20 % of the area afforested (UNECE/FAO 2005).

Naturalness and biodiversity. European forests are extremely polarised with respect to the characteristics "***naturalness***" and "biodiversity". On the one hand, forests in densely populated regions have been intensively managed for roundwood production and ***recreation*** over hundreds of years.

On the other hand we may find regions that still comprise of vast and completely natural forest with undiminished biodiversity. A survey study conducted on behalf of the MCPFE (Ministerial Conference on the Protection of Forests in Europe) in 40 European countries shows that only 27 % of forests are undisturbed by man while 70 % can be characterised as semi-natural and 3 % as ***plantations.*** The latter's ecological dynamics have been altered by human interventions without changing their natural characteristics completely. Twelve countries reported that they had no forest undisturbed by man at all. With regard to the category "other wooded land", the share of undisturbed areas is higher: In the Russian Federation (260 million ha or 32 % of the country's forest resources) and the Nordic countries (about 8 million ha) sizeable shares of other wooded land are classified as 'undisturbed by man'. Average data for the 40 countries show 28 % in comparison to 62 % semi-natural forests (MCPFE 2003). In addition to these estimations, the UNECE/FAO survey concludes that 127 million ha (or 12 % of the area of forests and other wooded land in those countries) is protected for biodiversity or for landscape in 34 European countries. On 3 % of this area no active intervention takes place. Another 3 % is subject to minimum intervention. 79 % are actively managed for conservation management and 15 % are designated as landscape protection areas. Moreover, the ***Natura 2000*** programme initiated by the EU has set aside large forest areas for biodiversity conservation (UNECE/FAO 2005).

When viewing this data from a landscape perspective, we may state that biodiversity, naturalness and stands with several tree species do have a say in influencing the character of a landscape positively. Old-growth forest, broadleaved forest, deadwood and large trees are considered as enrichment, rendering forest landscapes more attractive. In contrast, monoculture plantations with introduced fast-growing species can change the landscape in a negative way. Baring witness of the latest development in Southern European countries, these plantations are prone to forest fires and can heavily disturb the local water regime. When taking into account the interests of potential forest visitors, we may also underline that protected forest, albeit its restricted access and regulations, most often is considered as adding to a charming and beautiful landscape.

Forest condition. Despite all efforts, today's forests remain in a non-optimal condition. A survey published in 2005 (UNECE 2005) shows that more than 23 % of the trees assessed (135,000 in 31 countries) have to be classified as damaged, with defoliation and defoliation trends varying greatly between species and regions. Most of the main species, and more specifically common beech (Fagus sylvatica), exhibit a clear worsening of crown condition as compared to the previous year. However, this very recent development may be assigned to the unusually hot and dry summer/autumn of 2003 as a single explanatory variable. ***Forest decline*** as a result of ***air pollution*** was a major topic during the 1980s and managed to position itself at the very heart of the ecological agenda. Most European governments adopted measures aiming at reducing the level of pollution. But while these policies effectively improved the quality of air, air pollutants and indirect effects (soil acidification) continue to take their toll. The areas most affected are the soil-fragile mountainous regions in Central and Eastern Europe (Mikułowski et al. 2005).

Environmental decline is but one of the underlying factors explaining deterioration in the state of forests. In total, almost 10.8 million ha (1 % of forest and other wooded land) were reported to be damaged by other known causes (MCPFE 2003). More than 7 million ha were affected by storm, wind and snow; more than 4 million suffered from insects or disease. Wildlife and grazing is believed to cause severe damage in overpopulated or overpastured regions. The heavy storm in December 1999 was responsible for the highest single-factor damage ever reported in Europe, amounting to nearly 200 million m^3 of merchantable timber, i.e. almost half of the annual European wood production. Since 1982, the average annual area burned by forest fires in Europe has summed up to 1.9 million ha, with 1.3 million ha of forest fires in the ***CIS*** sub-region (mostly in the Russian Federation), 510,000 ha in Western Eu-

rope and 60,000 ha in Eastern Europe (MCPFE 2003; UNECE/FAO 2005).

We conclude that large-scale damage heavily influences the picture of the overall forest landscapes. Where there used to be closed mountain forests, ***forest decline*** in the 1980s led to an opening up of former closed mountainous formations. In other regions, starving trees became visible for everyone. Many clearcuttings had to be undertaken to save the timber for use before complete decay. On the other hand, damage caused by fire or storms like in 1990, 1999, 2004 and 2005, may also give way to an acceleration of positive landscape change. Where the 1990 and 1999 storms had left large gaps in the stands, very often these gaps were closed by converting conifer forests into mixed or ***broad-leaved forests*** by planting broadleaves or simply using natural regeneration.

Underlying causes for the transformation of forest landscapes

Human activities are considered to be the proximate causes of land use and landscape change. Humans make use of, and hence change or maintain, attributes of land cover. Possible forces driving land use and land cover changes can be grouped into six categories: population; level of affluence; technology; political economy; political structure; and attitudes and values (Turner et al. 1993). An elaborated scheme focussing especially on the causal factors of forest land use change has been presented by Kankaanpää & Carter (2004b). It is based on the distinction between proximate, underlying and other causes (Tab. 1).

Mather's model of forest transition (Mather 2000) examines the relationship between forest trends and socio-economic factors. It holds some explanatory power for the question why European countries are presently able to expand their wooded areas where some time ago they have been struggling to keep only some of their forests wholesome. While the model in its extended form presents four hypothetical dimensions, three of them are especially relevant for European forest landscapes:

(1) transition of forest area (from declining to expanding forest extents);
(2) transition of forest management forms (from natural forests to managed forests and plantations);
(3) transition in forest paradigms (shifts from pre-industrial to industrial and post-industrial thinking).

Tab. 1: Causal factors influencing forest land use change (source: Kankaanpää & Carter 2004b)

Causal factor	Cause
Demographic: population growth/change; rural population change; migration	Underlying
Economic: timber demand/supply; income distribution; tourism	Underlying
Institutional: specific policies (forest, agriculture, rural development, environment …); state intervention in forestry; level of democracy/participation	Underlying
Cultural and social: attitudes and preferences towards forests; historical/cultural values; scenery values	Underlying
Technological: technological progress; forest management practices	Underlying
Crises: war; abrupt political changes; abrupt economic changes	Other/ social triggers
Environmental: biodiversity; carbon sequestration; pollution	Other
Land quality: productivity; species distribution; soil quality	Other
Land use: land use intensity; availability of land; agricultural / urban land use change	Proximate

(1) Forest area transition. A number of independent socio-economic variables is supposed to determine the mode of transition of European forest areas, most of them predicting an increase in forest areas. We can actually observe that (i) changes in agricultural policies have reduced the demand for agricultural land in a number of European countries. Incentives included financial payments for the conversion of agricultural land to other land uses such as the establishment of forest plantations. (ii) Industrial policies in Eastern Europe resulted in urbanisation and rural depopulation, leading to abandonment of agricultural land and, again, conversion of some of this land to forests. (iii) Afforestation policies, i.e. forest policies that deliberately encouraged afforestation, have been particularly important in Western Europe. Those countries with the highest growth in forest area are also the ones where the establishment of forest plantations has been given greatest political support (Belgium, Denmark, France, Ireland, Portugal and the United Kingdom). (iv) The process of land restitution in the countries in transition to market economies explains to some extent negative shifts in forest areas because some forests were converted to agricultural land. (v) Overharvesting, in combination with grazing in forest areas and some deliberate ***conversion*** of forest to agricultural land, has led to reductions in forest area in some Mediterranean countries. (vi) The more recent problem of illegal harvesting of ***forest resources*** mostly affects some of the countries in transition. (vii) In some regions (especially mountainous and remote areas), the change in socio-economic factors allowed ***natural regeneration*** to play an important role as abandoned agricultural fields became forests again. This is a possible explanation for some of the increase in forest area in Scandinavian countries in the 1950s and 1960s, but also for the development in alpine areas (UNECE/FAO 2005; Weber 2005).

(2) Forest management transition. We have already discussed the degree of naturalness above, putting emphasis on the fact that almost all European forests are to some degree managed forests. Pristine forest landscape only exists as a residual type in remote areas of Northern and Eastern Europe. However, some underlying socio-economic factors may also predict a long-term shift into the opposite direction: with a growing group of (mostly urban) private forest owners who are not interested in (commercial) forestry at all, at least some of these forests could regress into a new kind of semi-natural forest.

(3) Changing forest paradigms. The ongoing migration from rural areas to urban centres and the resulting concentration of people in urban settings (Fig. 2) causes significant changes in life styles, values and attitudes of people. In consequence, profound alterations in social perceptions of the roles and functions of forests have emerged or are about to be constructed. Some of these newly constructed perceptions have already found their way into 'modern' forest management concepts (Mery et al. 2005).

- Multifunctional/multipurpose forestry has been applied as a comprehensive management concept to most of the forests in Europe. It emphasises the multiple values of forests beyond the production of timber. Most recently though, the concept experiences a shift from application at the stand level to management units on a higher level (forests, forest landscapes). This phenomenon rests upon the fact that it proves to be very difficult to fulfil all the increasing expectations (e.g. for timber and water) on a limited area.
- Sustainable forest management and sustainable landscape management has been accepted by foresters, politicians and many other societal groups to a similar degree as ***multipurpose forestry.*** The latest approaches of sustainable landscape management treat forests as a single, albeit indispensable element of landscape (Larsen 2005). One example for putting to practice the concept of sustainable forest management as an integral part of landscape management is the large-scale conversion of coniferous forests (especially Norway Spruce (*Picea Abies* and *Pinus sylvestris*) (Hansen & Spiecker 2005).
- Forest restoration and forest landscape restoration. Forest restoration is based on the assump-

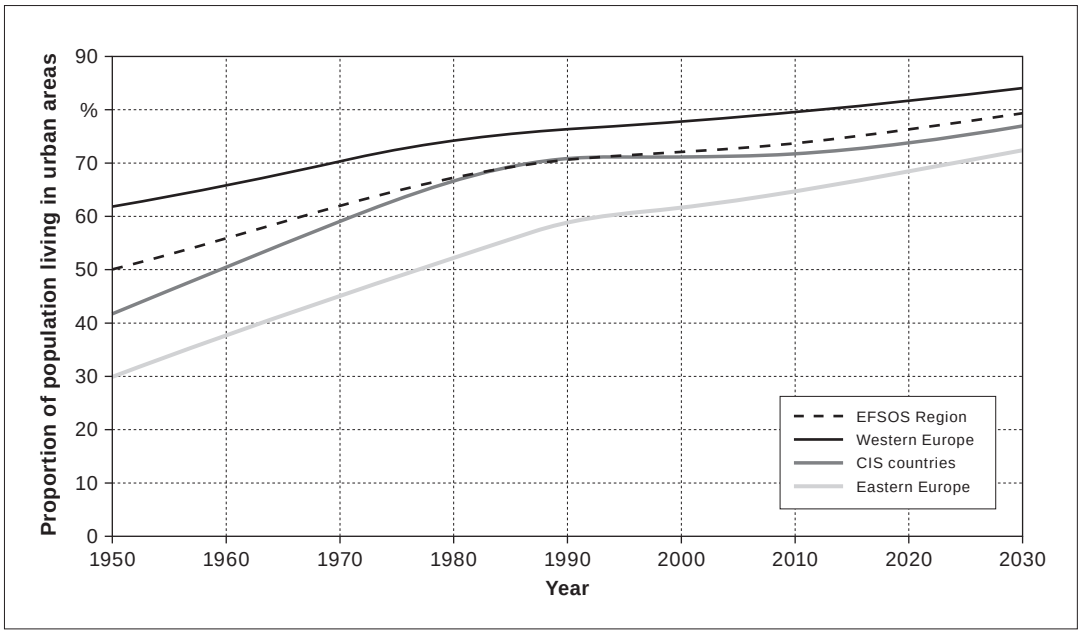


Fig. 2: Trends and projections for urbanisation in Europe from 1950 to 2050 (source: UNECE/FAO 2005, EFSOS: European Forest Sector Outlook Study)

tion that forests are resilient. As soon as environmental disturbances come to a halt, agricultural and urbanised land will revert to forest. The long-lasting reversion process can be accelerated by human intervention, e.g. afforestation of agricultural or reclamation of urbanised land. However, restoration to natural forest conditions is not possible on sites that have been severely degraded beyond the 'point of no return'. In these cases, new plantations are better phrased 'replacements' (Stanturf 2005). Without regarding these technical definitions, the concept of forest landscape restoration puts emphasis on restoring a forest's functionality: it focuses on goods, services and ecological processes that forests can provide at the broader landscape level, moving beyond former approaches of solely promoting increased tree coverage on a particular location (Maginnis 2005).

- ***Urban forestry.*** Forests located in the surroundings of urban regions are constantly suffering from high pressure. Moreover, competition between different forms of land use is often decided in favour of clearings for new settlements or infrastructure. As a result, forest areas are getting increasingly fragmented and exposed to high levels of ***disturbance*** (visitors, noise, toxic agents). While these sampling of trees have to come to terms with stress and pollution, management schemes respond to the demands voiced by the urban population (reduced cuttings, recreation facilities). The resulting process has been described as the "urbanisation of forests" by J. D. Paris, 1972. As a general rule, a remarkable "urban forest landscape gradient" (Bradley 1995) can be observed, ordering the urban forest space from the city centre to the periphery.
- Participation and public involvement are principles that are gaining strong influence as alternative ways of policy making. Consequently, more people are integrated in decision making processes on forests. This is especially the case in the surroundings of urban agglomerations.

To summarise, human induced changes of the landscape structure are indeed dominating. Although it may still take a long time for political decisions to be implemented (and even longer until new paradigms find wide acceptance), scientific and technological progress facilitate man-

made changes of landscapes within a relatively short time horizon. Modern timber harvesting machines and cultivation devices are able to remove a whole forest within a few days while fast-growing tree species can convert agricultural landscapes to forest-type landscapes over the modest time span of a few years.

Outlook for the future

Forests have always been and will continue to be an integral element of the pan-European landscape. Our analysis of European forests' historic development has helped us to understand present conditions as well as recent transformation processes. In the future, forests' appearance will continue to be determined to a great extent by those factors that have already started to play an impact on landscape transformation (see **Underlying causes for the transformation of forest landscapes**). Shifts in local demand for forest goods and services, combined with further integration of the global markets for forest products and an overall climate change, may continue to alter the European forest landscape significantly.

Policy development will continue to have a major impact on all parts of the forest sector. Forest-related policies can effectively influence the forest sector in general and forest land use change in particular. The size of the forest area, location and purpose are not designed by nature alone, nor do management practices and species composition stay in the realm of strictly private affairs. These developments are at least partly due to a collective decision-making process with a well defined objective followed by administrative measures aimed at implementing the policy guidelines. Historical policy developments have altered the sector significantly by setting costs and prices, by inciting the use of new technologies and by favouring the supply of certain raw material. More recently, cross-sectoral policies (especially rural development policies), were set up to shape the sector more comprehensively, thus setting trends for future development. Even if not all of the targets will be implemented, the policies already indicate the overall direction of the European forest sector. We know that changes on the ground will take a long time to materialise because of the forests very own long-term characteristics, but as a shift in management paradigm that should lead to a new turn-around is not visible yet, today's decisions will probably have an enduring impact (UNECE/FAO 2005; Kankaanpää & Carter 2004a).

Europe's forest resources will continue to expand. Due to afforestation and natural succession the total forest area in Europe is expected to increase by around 5 % between 2000 and 2020. While afforestation is primarily used on recently abandoned agricultural land, natural succession is most likely to occur on marginal lands in mountainous and boreal areas. Despite the increase in total forested area, the amount of 'wood production sites' may constantly be reduced as more forests are set aside for other functions (biodiversity conservation, recreation, protection). Average increment will continue to increase over the next two decades and will only slow down by 2020 (Gold 2003). European forests will not only expand, they will also grow faster than ever before - and faster than they are being cut. The increase in productivity will open up new opportunities to broaden the scope of management objectives. Admittedly, this is not yet a solution for the financial difficulties of the forest sector that might continue for some time, rendering necessary further innovation and adaptation (UNECE/FAO 2005).

The focal point of wood production could shift from the West to the East and from the North to the South. Last decade's rapid and dramatic political changes have placed Eastern Europe and the *CIS* sub-region in a very competitive position

in terms of wood supply and production costs. In contrast, the forest sector in Western Europe is likely to continue its expansive growth with the objective to meet the changing social needs (UNECE/FAO 2005). In addition to a shift to the East, a shift to the South is likely to take place. Up to now, fully industrialised countries in Europe and North-America have been dominating production and trade of forest products. During recent decades however, Asia's, Africa's and Latin America's share in both production and worldwide trade has steadily increased. Although shifts in the pattern of production are not necessarily reflected directly in the global trade patterns, the share of developing countries in trade is also rising (Mather 2000). Theoretically, the changing trade patterns could influence European forest landscapes as incentives for timber production are reduced and other forest products or services may generate larger pay-offs.

New recreation trends will change the appearance of forest landscapes especially in the surroundings of urban agglomerations. Even though many people will continue to prefer natural forests as recreation sites, innovative management concepts are likely to influence the landscape in areas of intensive recreation (e.g. tree crown paths). As a consequence of the ongoing process of urbanisation, forests in the surroundings of urban spaces will be affected in several ways. First, the pressure on existing forests will increase as demand for recreation sites rises. Second, new forests will be planted especially for recreation and other social purposes. In Britain and Ireland, so-called NeighbourWood forests have been developed. They are primarily designed for public access, recreation and enjoyment. Third, forests on former industrial grounds and in the surroundings of urban agglomerations (e.g. Saarkohlenwald in Germany) may serve as an explicit link between culture and nature (Weber 2004).

***Climate change* will alter the tree species composition and shape of future European forest landscapes.** The scientific community, as represented by the Intergovernmental Panel on Climate Change, expects temperate climatic conditions to be moving northward. Projections fulfilled, these changes (including more extreme weather events such as storms or sustained periods of drought) would alter the composition of species and forest productivity in Europe over many decades. Some regions would benefit from this development, while others would suffer from severe damages. Some of the more fragile forest ecosystems (comprising species at the edge of their climatic range) could collapse, but would eventually be replaced by new ecosystems. These changes would only become visible on a significant scale after many decades. At the time being, forest ecosystems managers can only try to consider possible consequences of the projections (UNECE/FAO 2005).

Segregated landscapes could develop into integrated landscapes. Forestry in Europe might no longer be viewed as an isolated form of land use but as part and parcel of regional land use management schemes. We have already outlined recent shifts in land use paradigms (e.g. forest landscape restoration, multifunctional landscape management) favouring landscapes over of single resource land use. Some authors go as far as promoting wholly integrated multifunctional landscapes with crops, trees, meadows and forest patches (Larsen 2005). Realizing these visions (including the re-introduction of forest pasture) would mean to change the landscape character fundamentally, especially in Central Europe. Reintroducing large ***agroforestry*** systems in Europe would eventually lead to the diffusion of the traditional segregation scheme differing between natural forests, intensive agriculture and forest plantations that had been adopted during the 18th century.

Agricultural Dominated Landscapes

U. Riecken and G. Kaule

Abstract /Анотація

Одночасно з промисловою революцією у сільському господарстві Європи з 1850 року сталися драматичні зміни. Перш за все, через модернізацію лісового господарства сталося чітке розділення різних способів природокористування. При цьому велику роль відіграли запровадження мінеральних добрив, оптимізація сільськогосподарської техніки, землеустрій, меліорація і застосування пестицидів. Наслідком було зростання небезпеки для багатьох видів тварин і рослин та їх місць проживання і місцезростань.

Трансформаційний процес у Східній Європі частково вів до зворотнього розвитку в сільському господарстві. Комбінація нерегульованого випасання і заготівля лісу на паливо нагадує стару, близьку до природної, систему випасання. Багато видів в процесі коеволюції з часів льодовикового періоду пристосувалися до цих напів-відкритих ландшафтів, які через це утворюють тепер основу для європейського біорізноманіття.

Порівняння країн довгорічного і недавнього членства в Європейському Союзі і країн, які не є членами ЄС, робить розвиток сільського господарства в останні десятиліття більш зрозумілим і дозволяє робити прогнозування на майбутнє. Можна передбачати, що рано чи пізно в Україні аналогічно до Західної Європи дійде до спеціалізації у сільському господарстві разом зі зростанням числа великих підприємств і зменшенням числа дрібних селянських господарств, що буде супроводжуватися спадом зайнятості.

На Подільській височині будуть впроваджені великі підприємства з модерною агротехнікою, а на Прикарпатті, залежно від інфраструктури, альтернативної зайнятості і плодючості ґрунтів станеться спеціалізація або виникне вибір між залісненням і залуженням земельних площ. У Карпатах же існує альтернатива об'єднань у великі підприємства, впровадження екстенсивного господарювання або та сама проблема залуження або заліснення.

Development of cultural landscapes

Cultural landscapes are the result of the interaction of mankind and his needs and the regional and local environmental conditions. The human user was continuously changing the landscape to increase the natural productivity and optimise his yields. This was limited on the one side by the natural factors on the other by the technical standard and the socio-economic frame conditions, e.g.:

- Population density, urban development;
- Migration of labour capacity to the cities;
- Demand for specific products;
- Infrastructure, access to regional and international markets;
- Subsidies, government transfer actions, e.g. EU agro market organisation.

The demands and the socio-economic general setup are changing continuously, the ongoing technical progress is influencing not only the labour input but also the site preferences. The investigated landscape in a time window is a candid shot

in an ongoing process. The reference, the natural landscape is changing as well.

The ecological factors and the natural frame conditions for land use optimisation or degradation are represented in agro ecological units, the Upper Dnister Basin participates in 5 of 9 soil-climatic zones represented in the Ukraine: I East European Lowland (transition zone to the Baltic Sea), II Forest Steppe represented in the Podolian Loess Plate, IV 1 Precarpathians, VI 2 Carpathian mountains, VI 3 Trans-Carpathian foothills.

These major zones are specified in the Oblast and Community level (🕮 *Scaled Agro-ecological Classification of the Ukraine*).

The mountain landscapes, which are in the main focus of ***nature conservation*** in this analysis represent ecological conditions which influenced the historical development of the cultural landscape (🕮 *Land Use History*). As reference units a gradient to the high productive black soil in the ***Podolian Plate*** is analysed and reflected with comparable production conditions in the EU. The conditions for ***agriculture*** in the inner mountain zone are marginal: steep slopes, shallow soils, narrow valleys, short vegetation period in higher altitudes limited ***arable land*** (agrarian use), which is decreasing from the foothills to the Inner Carpathians. Other agrarian uses dominate the landscape, specifically pasture ***husbandry*** systems which are also documented for other middle altitude mountains and the Alpine region (Konold et al. 2004; Lederbogen et al 2004). Often the ***transhumance*** is characteristic (Beinlich 1995; Didebulidze & Plachter 2002; Jacobeit 1961; Mayor-Lòpez 2002) or a short distance migration in the seasonal cycle. The early husbandry systems were very similar to the migration and fodder preferences of the predecessors of the present day domestic livestock species (Küster 1999; Rackham 1986). The strong segregation of forest, pastures, ***meadows*** and arable land, which is typical for modern cultural landscapes, is a recent development since the middle of the 18th century. A dominant role in this segregation process was played by the modern ***forest management*** (Lederbogen et al. 2004). The transition process redeveloped forest pasture to feed the cattle and to collect firewood for private needs.

In the mountain zone, the cattle were housed in the winter. In spring, pastures near to the farm provided the first fresh diet before the livestock was transferred to higher mountain pastures. Hay was made on meadows near to the estate and on mountain meadows. In the autumn, the cattle were brought back to the meadows near to the farm. The pastures in the mountains were often shared by several farmers and common herded. This seasonal cycle is one of the oldest farming systems that we know and was probably run in similar ways over more than 1,000 years (Goriup 1999; Mayor-Lòpez 2002; Rackham 1980; Schwabe & Kratochwil 1987). This husbandry system has many parallels to the pasturing cycles of wild large herbivores and belongs to the agricultural systems most similar to natural systems, as long as the stock density is balanced.

These pastured landscapes were characterised by multiple uses, which became extinct in the old EU member states: harvesting of firewood and timber, oak bark for tanning, pollards for tree hay, cork, turpentine, fruits, fence material, roof cover material, ship building. The material was mainly used for self supply, depending on the small yields and the distance to markets. Almost all ecosystems produced by these uses are listed in Annex 1 of the ***European Habitat Directive.*** Remainders of these ***grazing*** systems and the overlaying land use systems in Europe are currently investigated in an EU Project (www.lacope.net). In the small, tolerated private sector in the Soviet Union period elements of this old land use system survived. The pressure for ***self supply*** on the households in the transition time forced the recovery of elements of this tradition in the Carpathian communities. These communities are characterised by small farms, labour intensity for the families (mainly the women, children and old persons), since the men try to find work in cities or other countries (🕮 *Social and Demographical Aspects in Rural Areas of Carpathians and Precarpathians*).

Importance for nature conservation

The traditional pastured landscapes are characterised by a high structural and ***species diversity,*** especially of species of ***grassland*** and ***ecotones*** between grassland and forests (Assmann & Falke 1997; Hüppe 1997; Lederbogen et al. 2004; 🕮 *Evaluation of the Nature Conservation Value of Habitat Types in the Cultural Landscape of the Upper Dnister Basin*). The co-evolution of landscapes and grazing systems since the Ice Ages in Europe led to a strong dependence of species on semi-open landscapes. A significant ratio of European biodiversity depends on, or is indirectly promoted by ***pasturing.***

Mosaic cycles produce landscape patterns in space and time. Edges and niches provide habitats for a high number of species.

The free roaming herds and flocks provide open and semi-open landscapes for species of forests and open grass land, for "migratory" species, for ecotone "users" and for species living in dynamic habitats (mosaic cycle).

Species of ***open habitats*** in the cultural landscape immigrated with the expansion of husbandry systems and farming from Asia Minor to Central and West Europe. Another part of open land species use pastured complexes as secondary habitats for dynamic ecosystems which got lost in modern landscapes, e.g. dynamic river systems (Tischler 1965, 1980; 🕮 *Changes in European River Landscapes*). Many of these species and habitats are endangered by intensification and segregation in modern landscapes (Fig. 1; Beinlich & Klein 1995; Riecken et al. 1994). Intensification and abandonment are the major negative impact factors on ***grasshoppers (Saltatoria)*** in Germany (Maas et al. 2002). ***Vascular plants*** of open nutrient poor habitats are much higher endangered, than the average (Korneck et al. 1998; Lederbogen et al. 2004; Stöcklin et al. 2000).

Traditional grazing systems, especially those with middle and long distance migration (***transhumance***) have important functions as dispersal vectors for light and heat radiation demanding species. Bonn & Poschlod (1998a) and Fischer et al. (1996) documented long distance dispersal of Saltatoria and diaspores of vascular plants by marked sheep. The net of the livestock drive routes provides, in addition to the active transport, migration ***corridors*** for open land species.
The importance of secondary open habitats is reflected in the targets of nature conservation in Europe. They are listed e.g. in the German Nature conservation law (Riecken 2002) or target ecosystems of England (English Nature 2006). Overlaying the national conservation activities, the ***European Habitat Directive*** has listed a number of open and semi open habitats in Annex 1 (Ssymank et al. 1998).

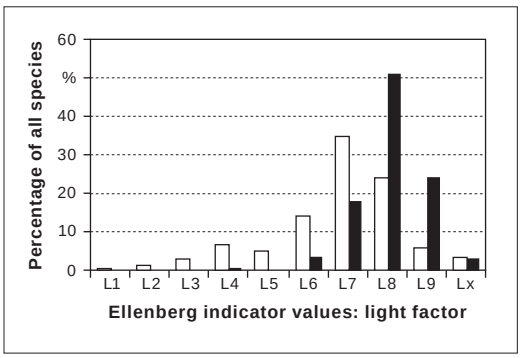


Fig. 1: Importance of open and semi open habitats for biodiversity protection exemplified with data from Bavaria: the majority of species listed in the red data book are species of open and semi open habitats (adopted from Lederbogen et al. 2004).

Development tendencies

The Ukraine will not be decoupled from the development in the EU and the world market conditions. Europe has faced dramatic changes in land use since 1850, parallel to the industrial revolution. The driving force was the introduction of industrial fertiliser and agro techniques. After the 2nd

World War, the speed of changes increased by optimisation of the production conditions: large land consolidation programmes, complex ***melioration,*** use of ***pesticides*** in nearly 100 % of the arable land, stalk stabiliser to increase the wheat production area and new corn breeds to increase the corn yield per km², both resulting in more narrow ***rotation systems.*** This development was supported in the states of the former East Block by the organisation of large collectives (Voigtländer et al. 2001) and a much higher regional specialisation, which often neglected the site differentiation and site complexes in the target regions for specialisation (🕮 *Effects of Transformation Processes in Crop Cultivation*). After the foundation of the EU and development of the common agro-policy, instruments for market control were implemented leading on the one side to further intensification, on the other side to increasing abandonment of marginal zones (Dosch & Beckmann 1999; Losch & Dosch 1997). The stronger state influence in the former East Block states and their campaign results in the marginal zones of these states to ecological and economic senseless intensification programmes in mountain zones, e.g. the increase of arable land and intensive meadows in the Thüringer Wald in East Germany or the intensive ***cattle*** production in parts of the Tatra high plateau. In parts of the EU states the traditional structures nearly got lost. Höchtl & Lehringer (2005) documented this situation clearly with an example in the Italian Alps showing the decrease of these structures. This development is ongoing.

Fig. 2 shows the development of farm sizes on the example of Germany. A decreasing number of small to medium-sized farms is clearly visible. The most notable decrease accounted for farm sizes of less than 5 ha. Only farms with more than 50 ha showed an increase. The total number of agricultural farms went down by more than a third in Germany over a course of only 13 years (1999: 653,360; 2003: 412,300).

The comparison of EU and non EU states in Europe documents the dependence of farm size on the time of affiliation to the EU (Fig. 3).
In the foundation members of the EU, Germany and France, only 25 % of the farms are smaller than 5 ha, in Spain, Portugal and Poland more than 50 %, and in Slovakia and Romania more than 90 %. Reverse is the situation for farms with more than 50 ha: In Germany 20.3 %, in France 32.9 %, in Spain 8.7 % and in Portugal 2.7 %. In Poland only 0.8 % are larger than 50 ha.

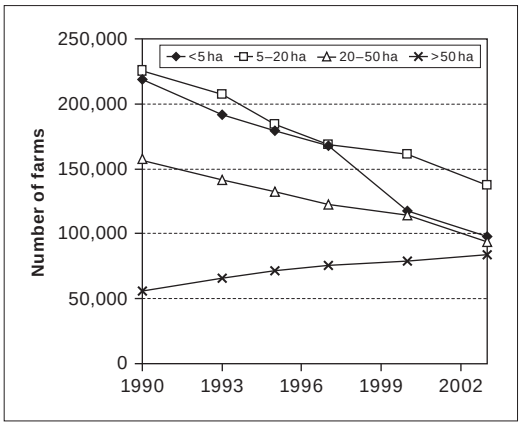


Fig. 2: Development of the farm numbers in Germany between 1990 and 2003, differentiated in farm size classes (source: Eurostat 2005)

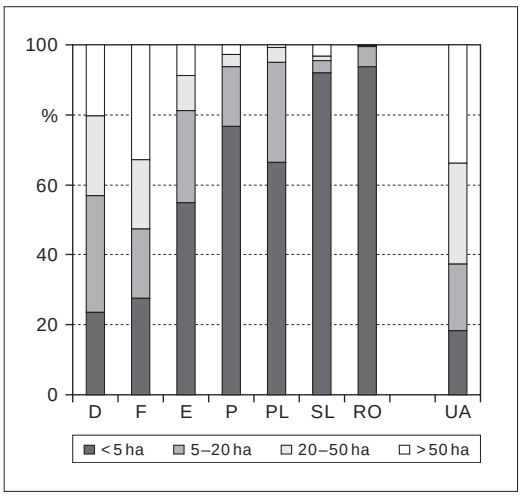


Fig. 3: Percentage of farm size classes 2003 in different countries of Europe. D: Germany; F: France, E: Spain, P: Portugal, PL: Poland, SL: Republic of Slovakia, RO: Romania (Source: Eurostat 2005); UA: Ukraine (Derzhkomitet Statystyky Ukrayny 2004)

The EU candidate Slovakia has 3.3 %, similar to Portugal and in Romania farms larger than 50 ha are negligible (0.3 %). Interesting is the fact, that

the structure in the Ukraine is similar to the EU founding members.

Comparable to Germany, the large farms concentrate in the ***lowlands,*** the medium sized and small ones in the mountain zones. This is well represented in the ***agro-ecological zonation*** and in the gradient of the study areas (🕮 *Scaled Agro-ecological Classification of the Ukraine*).

The data allow a high plausible prognosis for the development in future member states like Romania or Bulgaria. It is also to foresee, that this development will face, perhaps with postponement, also the non EU states in Europe. The small and medium sized farms will run out, their farmland will either be allocated to the large farms or will be abandoned or re-forested (see e.g. Luick 1997; Mattern et al. 1992). In the Ukraine a modern farm structure is represented in the plains, that means, the development prognosis is targeted to the mountain region and to the ***foothills.*** This development has significant impacts on the rural population and the employment structure. The number of employed in the agricultural sector will dramatically decrease, following the European trend. Fig. 4 compares in different states the percentage of employed of the total population in the agro sector compared with non agriculture sectors.

In the foundation members of the EU, less than 2 % of the population are employed in the ***agricultural*** sector. The percentage is higher in the younger member states, with Poland at the top with 5.73 %. Significantly different but similar to Ukraine is the situation in Romania with 12.4 % in the agro sector. With increasing interaction with the EU, dramatic changes can be expected, not only for the agricultural production systems and the population but also in the following process for the landscape structure, the settlements and nature conservation. These changes can be documented in the model communities: at those with good infrastructure access and labour alternatives, the involvement in agriculture is decreasing. That means, the national average is highly differentiated. In the Ukraine, the farm structure is similar to EU states, the ratio of ***employed in the agricultural sector*** is similar to Romania. It can be documented in the ***model communities,*** that the ratio of ***employed in the agro-sectors*** currently depends more on the alternatives and infrastructure quality than on soil quality and farm structure.

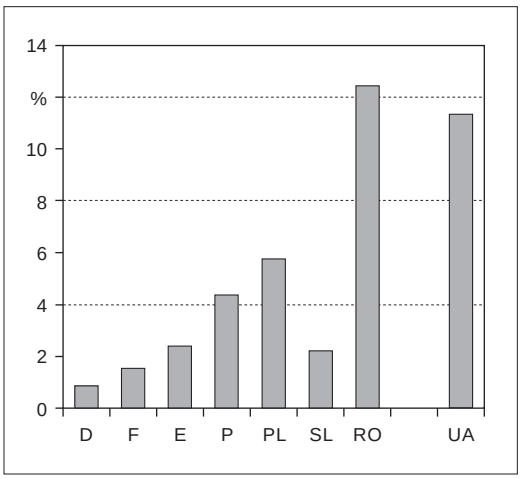


Fig. 4: Percentage of the total population employed in the agricultural sector (2003). D: Germany; F: France, E: Spain, P: Portugal, PL: Poland, SL: Republic of Slovakia, RO: Romania (Source: Eurostat 2005); UA: Ukraine (Derzhkomitet Statystyky Ukrayny 2004)

Perspectives

It can be expected, that the past and ongoing transformation processes of the older and younger EU member states will occur also in the non EU states of Europe. After a period of apparent stagnation the speed will be even higher since the differences in the economic standard to the neighbour states is extreme. That underlines the necessity for solid analysis and prognosis and convincing concepts. The development will be, and should be, different in the different agro ecological zones:

In the Black Soil Region of the Podolian Plate, the large farm structure allows a fast implementation of new modern agro techniques and mechanisation. At risk are the soils, since they are sensi-

tive for degradation (🕮 *Soil Erosion: Possibilities for Soil Protection*).

In the ***Precarpathians*** with good infrastructure and labour alternatives there will be segregation depending on the land suitability for farming.

The two extremes of the mountain zone are documented in the old EU states. The structure may change to larger farm units and more extensive production systems or agriculture will disappear (see Val Grand National Park in the Italian Alps, Höchtl & Lehringer 2005). European experience also shows, that in these regions active support of alternatives is necessary: ***tourism*** and ***recreation,*** traditional crafts, local food processing and direct marketing, local products with a regional brand.

In detail, the perspectives for model communities in the gradient from the agriculturally advantaged lowland to the disadvantaged inner mountain region are developed and discussed at 🕮 *Scaled Agro-ecological Classification of the Ukraine.*

Changes in European River Landscapes

R. Nobis

Abstract / Анотація

Напевно нема такого іншого елементу ландшафту, який би підлягав такому антропогенному навантаженню, як ріки, заплавні луки та ліси. Регулярні морфологічні зміни заплавних лук як резельтат нестабільного рівня води перешкоджають використанню заплав як шляхів сполучення, побудові стратегічно важливих транспортних розв'язок, залученню плодючих заплавних ґрунтів для сільського господарства. Аж так пізно, як до середніх віків, втручання в динаміку річок мало межі і головні зміни зводилися до осушення заплав і вирубки лісів. Однак обсяг і кількість змін збільшилися з початком промислової революції. Цілі гідротехнічних робіт були головно такі:

- отримання догідних земель для сільського господарства,
- обвалування річок як захист від непередбачуваних повеней,
- використання річища в транспортних цілях,
- побудова гідроелектростанцій,
- утворення ставків як резервуарів для накопичення і очищення питної води.

Порушена динаміка течії річок вже має далекосяжні результати для структури взаємин між річкою і заплавою. На додаток, протиповеневе обвалування захопило великі площі заплави.

Описуються типи і наслідки втручання в регульовані річки і порівнюється стан річок в різних країнах Європи. Спеціально об'єктом дослідження були впливи регулювання на природні біотопи річок та їх заплав. Збільшення кількості катастрофічних повеней в останні десятиліття спостерігається на різних річках як наслідок подальшого зменшення заплавної території та випрямлення русла річок та їх допливів. Кілька проектів для ренатуралізації річних ділянок на великих ріках Європи демонструють шанс для більш природного розвитку річок у майбутньому.

Introduction

Nearly no other type of landscape is subject to so much of human influence like the rivers and their floodplains. The regular morphological change of the ***floodplain*** meadows as a result of changing water levels resisted the use of floodplains as transport road, settlement of strategically important crossings and agricultural usage of the nutritious floodplain soil. Until late into the middle ages, interventions into the dynamics of rivers had limits and the main changes were restricted to a usage of the floodplain for drainage and clearance of woods. The amount and number of changes, however, have increased since the beginning of mechanisation. The aims of hydro-construction were mainly:

- gaining agriculturally usable land;
- diking against unplanned events of flooding;
- opening the riverbed for transport;
- usage of waterpower;
- resources for storing and purification of drinking water.

The interventions into the course of the river consisted of the construction of a main channel with as few loops as possible by means of straightening, relocation of the riverbed or unification of several arms. The riverbed was stabilised and enhanced at the bank and usually also at the sole to prevent changes of the course of the river (Zundel 1997). Other very substantial interventions into the dynamics of the river are the installation of cross-river-constructions like barrages or water power plants, which interrupt the downstream transport of material. Furthermore, material which had already been deposited is regularly removed from the bed of navigable rivers. The lacking dynamics of the river course have already had far reaching results for the structure of interaction between river and floodplain. Additionally, the floodplain areas are subjected to the diking off of large tracts of land.

The constructional consolidation of river systems was motivated furthermore by the idea of controlling the nature and of ordering a system, which seemed chaotic. River Mur in its natural state for example was called a degenerated river before the reconstruction of the ***riverbed*** (Schneider-Jacoby 1996). Tulla, a hydro-construction engineer, formulated the aim of the construction works for consolidation as follows: "Generally, the rivers and streams of a cultivated country should be channels and the course of the waters should be in the hands of the inhabitants (Tulla 1822)."

This view, however, prevented an understanding of the often very complex system of rivers and floodplain meadows and forests and also an understanding of the lasting results of the interventions.

Types and results of interventions to regulate rivers

The wealth of species, which is typical for a floodplain, results from the extraordinary variety of locations and the constantly developing dynamics of time and space. The river is linked to the floodplain via changes of the level of the ground water. If the water level exceeds the level of the riverbed, the floodplain is flooded by streaming surface water, with ***sedimentation*** and ***erosion*** going on in the same way as in the riverbed. These processes differ depending on the existing topography of the surfaces, the distance to the riverbed or the duration of the flooding and the speed of the currents. Depending on the type of the deposited material, sedimentation processes can create highly productive locations. The riverbed is constantly moving, thus creating new structures of different kinds: e.g. gravel banks, bayous, pools, bluffs. While these structures change their character during the course of succession, they are created anew at other places at irregularly reoccurring intervals. In total, a spatial and temporal coexistence of different structures is the result; structures, which are furthermore differentiated by their distance to the water level. Small differences in surface height can thus have great influence on the development of seemingly equal locations.

This system is disturbed by the interventions mentioned above. The construction of ***dikes*** close to the bank leads to an increased erosion of the remaining floodplain. Hollowing of the river sole and a sinking of the ground water level are the results. With that, the floodplain is hydrologically separated from the river; the manifold interactions are interrupted. At the river Rhine for example, the changes in ground water level shrank from 2–4 m to a few cm or dm after the improvement. 60–80 % of the diked off floodplain lost the contact to the ground water level with that. Where the connection is still existing, flooding via ground water or bank filtrate occurs; however, the entry of sediment into the floodplain is lacking and with that the organic and inorganic ***fertilisation.*** Peripheral waters and standing floodplain waters are cut off from the regime of ***flooding.*** The result is an accelerated landing process without the creation of new structures.

Fig. 1: Most European rivers are diked at the river bank leaving no floodplain like this section of a Dnister tributary in the Precarpathians

The remaining river, often consisting of not more than the riverbed (Fig. 1), is subjected to further manipulation. To guarantee constant navigability, a course of the river is necessary, which does not change anymore and which offers a constant water level. After the artificial straightening of the river, banks and sole are fortified to prevent changes of direction of the river. With that the typical change of erosion and sedimentation processes of a floodplain is interrupted. Once the erosion of the banks and floodplains is stopped, it can only happen at the sole of the river. On the other hand, fine ***sediment*** is no longer deposited, if the floodplains are missing and the flowing speed is high. Groynes and approach piers secure an even navigation channel even in periods of little water. Islands, sand and gravel banks, if obstructing the navigation, are removed; new structures cannot form because of the high flowing speed of the water.

In the 20th century, the pressure to utilise the floodplain increased because of an increasing population and new or improved techniques for the regulation of rivers. The result was a more intense reshaping and redesigning of ***river landscapes*** with a parallel loss of variety of locations (Schönbäck et al.1997). An increasing expansion of the settlement and infrastructure development reduced the rest of the floodplain constantly. The drainage of waste water into the river, the drawing of water from the river for industrial use and as cooling water changed the water's quality and temperature. Cross river constructions for damming, which have existed since the 20th century, have been developed further and have grown in dimension (Cushing 1995). Apart from the securing of navigability they serve for drinking water reservoirs and for energy production. Because of the damming, the character of the water changes from flowing towards stagnant. If damming and lowering of the ground water level occur at the same time because of ***drainage*** or use of ground water, a disconnection of the river from the ground water can be the result, because damming increases the density of the riverbed and restricts the exchange with the ground water with

that. Furthermore, the quality of the drinking water worsens because of occurring reduction processes. A simulation of the ***natural dynamics*** by system of management is causing high costs and cannot reach the integration of peripheral waters into the dynamics (Schönbäck et al.1997).

Changes of the water level in the dammed up region are reduced to a minimum (Gerken 1988). ***Cross-river-constructions*** prevent a continuous transport of debris and fine grain material down the river (Schönbäck et al. 1997). Sediment in the region behind the dam has to be cleared regularly, at the same time this material is missing for sedimentation processes and for fertilisation of the floodplain. In the bank region of dammed waters fine grain material is deposited because of the reduced speed of the current to an extent, which is normally found in the lower reaches (Schönbäck et al. 1997). The oxygen regime and the content of organic material change above and below the dam (Gamerith et al. 1999). Below the barrages the river deepens its bed if more by sole erosion with the result of further lowering of the ground water level (Friedrich & Scheuerlein 1997). In total, the extent of effects of cross-river-constructions is wider than with any other hydro-construction measure. To use the example of the upper Rhine again, the river lost 15 % of its floodplains because of straightening, but a further 65 % because of barrages (Bachmann-Erdt 1994).

The mentioned effects are valid for nearly all the rivers of Europe (Tab. 1). While interventions in favour of a guarantee of navigability are predominant in Western and Central Europe (apart from the high losses of floodplain), the use of waterpower as energy is dominating in Northern and Eastern Europe.

Recently many of the still natural or nearly natural river sectors of different rivers are endangered by the construction of new dams and ***water power plants*** (Friedrich & Scheuerlein 1997; Schneider-Jacoby & Ern 1990). For example, a further use of the potential of hydro electric power of the river Danube is planned (Schönbäck et al. 1997), plans for River Drau include 6 more hydro electric power plants and numerous weirs and the remaining floodplains at the river Save are under threat because of the construction of hydro electric power plants, too. The floodplains of The Danube-March-Thaya system are endangered by new channel and dike constructions (Graner 1991), the planned improvement of the lower Saale for navigability, including weirs and cutting of meanders is not uncommon (Rode 2001).

Tab. 1: List of European rivers and their main interventions; Literature sources: Bachmann-Erdt 1994; Berg & Feltgen 2003; Cushing 1995; Friedrich & Scheuerlein 1997; Gamerith 1999; http://www.wikipedia.de; Klimo & Hager 2000; Rode 2001; Schneider-Jacoby 1996; Schneider-Jacoby & Ern 1990; Schönbäck et al. 1997; Zundel 1997.

River	Length catchment area drainage per year	Intervening measures	Share of floodplain loss
Danube	2,888 km 817,000 km²	**Austria:** from 1750 onwards improvement against floods and for navigation; 1861–1900 regulation, cuttings through meanders; from 1950 onwards construction of 13 barrages and 9 water power plants (free flow reduced from 3,670 km to 80 km) **Slovakian Rep.:** from 1850 onwards construction of dikes; Hydro electric power plants **Romania:** "Iron Gate", further barrages	–73 % in Austria
March Thaya	358 km 285 km	regulation (straightening, fortification of banks, diking) – finished at the end of the 1980s	
Mur	454 km	after approx. 1850 de-forestation, diking, melioration/drainage; 1875–1894 improvement of the river Mur; construction of 17 hydro electric power plants	–90 %

River	Length catchment area drainage per year	Intervening measures	Share of floodplain loss
Drava	749 km 11,828 km²	cutting through 62 meanders, reduction of the length of the river course by 60 %; 1970–1990 construction of 5 hydro electric power plants (floodplain forest completely lost)	
Tisza	1,308 km 146,500 km²	from 1300 onwards draining of the floodplains (resulting in steppe landscape – Pussta); after 1846 rebuilding of the river, shortening by 482 km within 40 years, construction of 4,500 km dikes	–95 %
Save	917 km 95,719 km² 53,15 billion m³/a	0 settlement, clearing/deforestation with features of erosion; after 700 use for grazing/pasture; after 1960 program "Save 2000" (forest clearing, drainage, construction of dikes, use as arable land, construction of 39 dams)	60,000 ha remained
Rhine	1,320 km 198,735 km²	1809–1876 straightening of the riverbed, reduction of river length by 81 km; 1928–1959 construction of a canal at the upper Rhine, removing most of the water from the river; after 1977 construction of several dam constructions	–87 %
Elbe	148,268 km² 27,7 billion m³/a	1100 construction of wall structures; until 1960 construction, strengthening and heightening of dikes; 1915–1990 diking of tributaries and movement of mouth to gain more incline; after km 97 the river Elbe is nearly completely diked	–86 %, in the east –80 %
Saale	24,078 km²	after 981 the river was made navigable; after 14th century the course was more intensively regulated; after 1930 channel formation and construction of reservoirs	
Rhone	812 km	after 18th century regulation; 1980 construction of 4 dams	
Volga	3,700 km	large reservoirs, drying out soil	
Ural	2,534 km	mainly natural, floodplain up to 35 km wide	
Don	1,870 km	70 % of floodplain is forest	
Ukraine	–	Hydro electric power stations, dams, dikes, straightening, drainage flatlands without natural floodplain structures	
Romania	–	880,000 ha floodplain, of which 419,000 at the Danube	
Poland	–		floodplain forest –97 %
Czech Republic	–	after 16th century hydro-construction and melioration	
Nether-lands	–	since Roman times clearing of forest; 1200–1300 all rivers diked in and floodplains without dynamics of floods	
Norway	–	more than 700 dam structures	
Sweden	–	125 large water power plants	

continuation of Tab. 1

Influence of the regulation on habitat types of river landscapes

Today, there is no completely natural river system in Europe anymore. Only individual elements of floodplain or some river districts can be qualified as close to natural. The only river, which is completely without constructions, is the Tagliamento (Friedrich & Scheuerlein 1997). The Lech in Tyrol is the only natural river with tributaries in the Alps; in Sweden only three rivers are not regulated. The largest floodplains outside Russia have remained in Poland at the Biebrza. In central Europe, the floodplains of the Danube-March-Thaya system are the largest interconnected floodplain landscape. With its size of 11,500 ha and despite limited flood dynamics (because of regulation and intensified use) it is unique when compared to other remaining floodplain landscapes, as the connections between river and floodplain are largely close to natural (Gamerith 1999). After an end of the intensive economic use a fast restoration of natural situations would be possible (Schönbäck et al. 1997). Well preserved floodplains can also be found at rivers which have served as political borders for a longer period of time or during the time of improvement. Examples for that are rivers Mur, Drava and Save. For the last one, an improvement was additionally prevented by technical limitation of changing the respective river sectors, so that today large, mainly natural floodplain forests can still be found (Schneider-Jacoby & Ern 1990).

At other places, only relicts of floodplains or floodplains with disturbed dynamics can be found. In Austria, for example, only 4 % of all water courses are still natural. The planned natural park in the Danube-March-Thaya floodplain just about reaches the minimum surface area for national parks. In the same way, ***floodplain forest*** as typical form of vegetation on floodplains exists only as relict. In Hungary, a total of 1,500 ha have remained of originally 2.3 million ha. At the Dnipro, 213,000 ha floodplain forest has been lost because of the damming. At the river March in the Czech Republic, 6,000 ha have remained, at the Slovak part of the river only 173 ha floodplain forest have remained with a connection to the river's dynamics. Of the floodplain forests at the Austrian Danube, only 20 % can be evaluated as natural or close to natural. In other countries, too, floodplain forests exist (Netherlands e.g. 2,500 ha), but they are very much changed in terms of location and variety of species. If the floodplain forests are cut off the river's dynamics, they retain their character for a long time, if they are not changed by forestry. A survival is, however, only possible, if the natural flood dynamics can be reactivated. Even bayous vanish out of the old floodplain only after 120 years of landing process. The remaining floodplain forests are changed by ***forestry.*** The loss of the annual fertilisation by sedimentation processes of the floods reduces the potential of growth of the trees and they are replaced by fast growing species, like hybrid poplar (Gerken 1988).

The formerly high variety at the location is today limited because of the strict division into flood-free floodplain, backwater floodplain and regularly flooded floodplain. The latter are in close proximity to the river, as the lowering of the ground water level as a result of river regulation and other measures have reduced the likelihood of floods. The result is a change in the surface shares of the river side populations. The share of the hardwood forest increases (Schönbäck et al. 1997). In the same way, there is a reduction of wet meadows as a location for rare and endangered ***red-list species*** to be noted. Many special locations e.g. bank and pioneer populations as well as the periodically water bearing sluices and pools are completely lost. While the diked out floodplain dries out because of the disconnection to the ground water, dry zones or especially species-rich areas of gradual change are missing in these floodplains of reduced size and higher current speeds in case of flood. Reservoirs and polders, which are flooded after years without flood in case of extreme situations, mean a great loss of animal and plant species, too, and do not allow a development of populations typical for floodplains. Finally, the spreading of species is limited, too, because both, the river and the floodplain are no longer passable to them (Gerken 1988).

Flood

A main aim of the centuries of regulation of rivers was the limitation and control of flood events. In the last years, however, the tendency towards increasingly strong floods could be observed. Reasons for that are mainly to be found in the results of the regulating measures.

As described above, the frequency of floods has decreased because of the lowered ground water levels. At the river Tisza e.g. the low water level was lowered by 2–2.5 m, at the same time the high water level rose by 2.5–3.5 m because of the narrowed draining profile caused by the ***dike*** constructions. An intensive use for agriculture and forestry as well as the extension of settlements and infrastructure has led to an increasing loss of flooded floodplain area. For the river Elbe alone the loss of retention volume is guessed at 2.16 billion m^3.

The straightening has resulted in substantial shortening of the water course; the water has a higher current speed within a shorter distance (Bachmann-Erdt 1994). The time a flood wave needs to move down e.g. river Rhine has been halved (Berg & Feltgen 2003). As an effect, the flood waves of main water courses and tributary courses are no longer staggered but simultaneous and the flood situation is increased.

A third aspect in the increasing power of flood events is to be found in the higher amount of surface water drainage within a catchment area after a precipitation. Reasons for that must be seen in the increasingly sealed surfaces, land re-allocation with drainage channels etc., intensive or locally inappropriate use of the land (Bachmann-Erdt 1994).

Because of that, flood events are more intensively influenced by weather situations than they used to be, which in turn show increasing intensities of extremes because of the changing climate. In total, it can be balanced, that manifold measures for flood protection have rather aggravated the flood events and that a total control by technical solutions is not possible.

Re-naturation

The damage of the summer 2002 Elbe and Danube flood amounted to about 18.5 billion Euros (Berg & Feltgen 2003). Although the effects of a too strong river improvement are known and a limitation of damage in case of future floods of such a dimension can only be gained by consequent developments following the flood showed the limits of effective re-naturation. An improved permeability of the draining profile of the tributaries of the river Elbe can limit damage locally, but might aggravate the flood situation in the main water course and should not be understood as a means of re-naturation. Another catastrophic flood in spring 2006 supported this theory. In the long perspective, the amount of potential retention areas is limited and the costs for a change of usage are high, because settlement and infrastructure development can not be undone. Lowering the flood of river Rhine at Cologne by just 6 cm would mean the creation of retention areas upriver with a volume of 100 million m^3, costs for such a project amounting to 500–2,500 million Euros (Berg & Feltgen 2003). As the ***retention areas*** are usually established as reservoirs or ***polders*** with inlet and outlet constructions, this cannot be viewed as real re-naturation. Such re-naturation can only be gained, if the natural dynamics of water level changes in river and floodplain are re-established and erosion and sedimentation create new morphological structures (Klimo & Hager 2000).

Against this aim, however, there is a multitude of interests in navigation, traffic planning, flood prevention, land use or administration, as their borders differ from those of the catchment area. The ***EU-water-guideline*** is a first step to cre-

ate structures for a holistic view. For river Weser, a concept has been developed, how a river landscape can reconcile usage and closeness to nature for a complete catchment area. The realisation of this concept seems to be impossible at the moment, due to a number of reasons. Apart from the difficult coordination of all politically involved decision makers and at times massive conflicts of interests of the different users, the costs are the main obstacle (Zundel 1997).

So projects for ***re-naturation*** are limited to river sectors of small area and usually only a part of the original dynamics can be re-activated. Either the regulation of the river is irreversible or the effects of water level dynamics on surrounding areas have to be prevented. Therefore, technical means are used for the re-naturation to gain greater control instead of a removal of the constructions. A local lowering of dikes can re-activate the dynamics, but in case of flood the floodplain is not flooded in a substantial area and with the normal, natural currents. The share of standing or only slowly flowing areas increases.

At navigable rivers, re-naturation concerns mainly the floodplain and less the river itself. The major share of re-naturation projects thus concentrates on smaller water courses, where there are no conflicts with shipping interests. At larger rivers there exist for example the following re-naturation measures:

- Danube: At "Regelsbrunner Au" the connection of floodplain waters by means of lowering dikes and artificial supply of debris below the dams to stabilise natural dynamics (Gamerith 1999);
- Rhine: see Danube (Schneider-Jacoby 1996);
- Elbe: project central Elbe – 5,600 ha flooding area are protected and developed (Berg & Feltgen 2003);
- Maas and other rivers in the Netherlands: modeling a natural floodplain morphology including the development of a semi-open floodplain-typical vegetation by grazing of wild animals;
- Saale: construction of ***fish stairs,*** improvement of permeability in case of flood, connection of floodplain waters to the water level changes, in individual cases back-movement of dikes, reconstruction of cross river constructions to allow better debris and sediment transport, gain of ca. 700 ha retention area (Rode 2001).

Geologic and Geomorphologic Overview of the Upper Dnister Basin

M. Huhmann and H. Brückner

Abstract / Анотація

Регіон басейну Верхнього Дністра, що знаходиться в Західній Україні, можна поділити на три основні ландшафтні одиниці: Карпатські гори, Передкарпатську рівнину і Подільську височину. Такого роду поділ базується на відмінностях у геологічній будові фундаменту та його генезису. Завдяки цьому також значно змінюються геоморфологічні характеристики. Подільська височина, що займає північну частину басейну Дністра, є частиною Українського кристалічного щита. Він складається з кількох блоків, що знайшло своє вираження в легко хвилястій припіднятій рівнині з глибоко врізаними річковими долинами, як от Дністровський каньон. На повну противагу цьому на півдні сформувався молодий третинний пояс Карпат – гір альпійського типу. Тектонічні піднесення, тектонічні покриви та розчленування розломами визначили надзвичайне різноманіття геоморфологічної будови. Різноманітні геоморфологічні явища викликані вивітрюванням, ерозійним, гравітаційними, а також плейстоценовими ґляціальними та періґляціальними процесами. Третю ландшафтну одиницю БВД репрезентує Передкарпаття, яке знаходиться між Карпатами і Подільською височиною, орогенезом пов'язане з Карпатськими горами. Впродовж третинного періоду геосинкліналь наповнювалася різного роду відкладами, перш за все моласами. Маргінальні тектонічні піднесення сучасної геологічної епохи спричинили незначне розчленування низовини на пологі межиріччя і широкі долини. Ці три відмінні ландшафтні одиниці об'єднані спільним елементом – течією ріки Дністер (Huhmann et al. 2004).

Introduction

The division of the landscapes into the three major parts ***Carpathian Mountains, Precarpathians*** and ***Podolian Plate*** is based on the geological settings of the Upper Dnister Basin (Friedlein 1993; 🕮 *Natural Geoecosystems of the Upper Dnister Basin*). The extensions of the landscape follow the shape of the geological borderlines from northwest to southeast (Fig. 1). Therefore, the genesis of the geomorphological characteristics of these three regions varies significantly (Fig. 2).

Geology and geomorphology of the Podolian Plate

The oldest geological structures occur in the crystalline basement of the Podolian Plate. For the most part made up of ***gneiss*** and ***granite,*** the bedrock is a part of the ***Ukrainian shield*** which belongs to the Precambrian craton of Fennosarmatia (Dolginov & Kropachev 1994). Two billion years ago, at the end of the Karelian orogeny, the development of the shield had been completed and a period of tectonical inactivity started. With the beginning of the Palaeozoic Era 570 Mio. years

ago, the stage of rest was interrupted by several short periods of tectonic activity. By the beginning of the Mesozoic Era, these movements had led to a separation of the Ukrainian shield into five plateaus (block faults) with the ***Bug-Podolian Block*** on the territory of ***Western Ukraine*** (Khain 1985). Despite different tectonic movements, the region was smoothed again. As a consequence, several widespread marine inundations occurred during the Silurian, Devonian, Cretaceous and Tertiary (Fig. 1). Up to 3 km thick packages of ***limestones*** and ***sandstones*** remained as a legacy of these geological processes (Zimm & Markuse 1984).

During Tertiary, the Podolian Plate was lifted up again as an effect of the Alpine orogenic movement. Within the same period, the existing rivers showed a strong incision which finally led to the formation of deep valleys like the ***Dnister Canyon.*** Different elevation levels of the block faults caused a slight tilting of the basement and the overlying rocks towards south so that the layers descend under the molasse of the Precarpathians. The Miocene surface layers ran as an unconformity in approximately horizontal strata cutting the underlying layers, levelling the relief into a gentle and slightly undulated elevated plain (Fig. 3). In the course of the ***glacial*** during the Quaternary stages, the area of Podolia was within the range of the ***periglacial*** climate. During this period, the surface was covered by ***loess*** with an average thickness of 3 to 6 m, and a maximum of 20 m (Neef 1974).

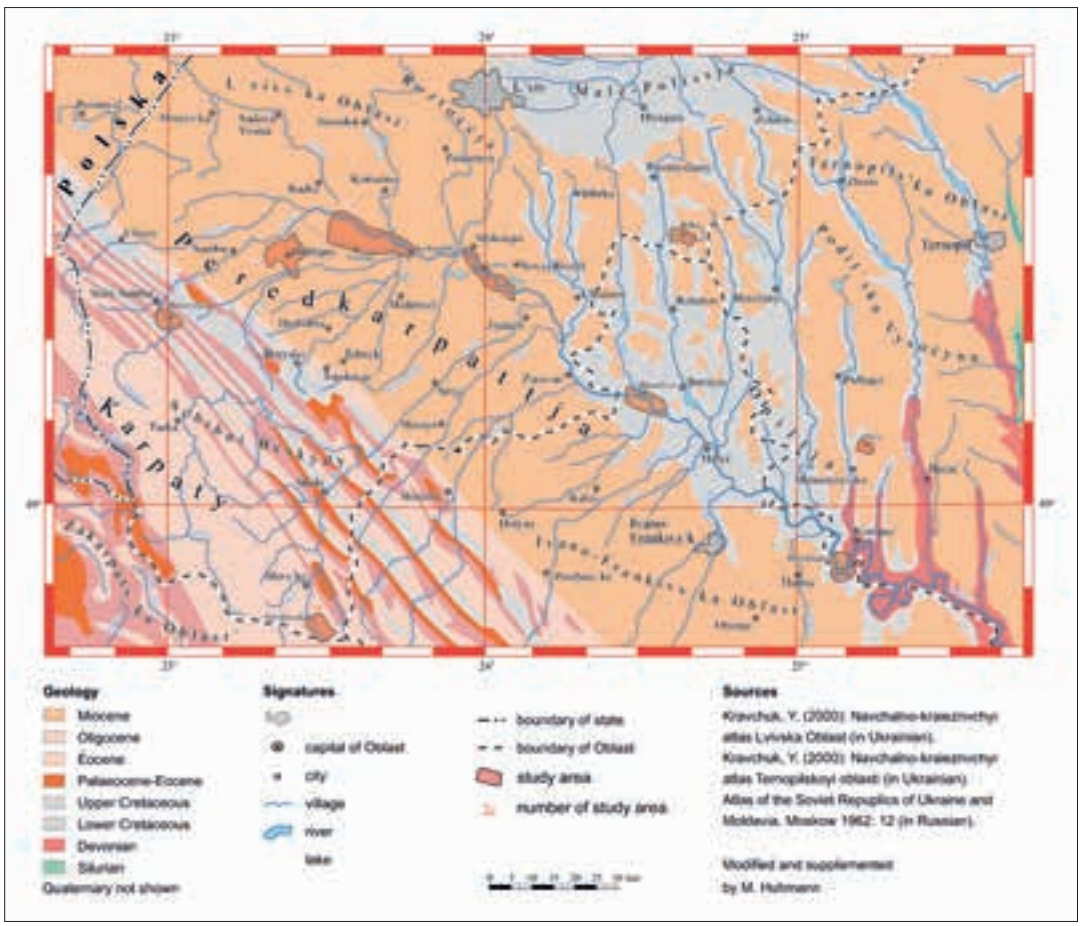


Fig. 1: General geological map of the Western Ukraine

From a geomorphological point of view, the Podolian Plate displays a slightly undulated character of a hilly landscape. The Miocene horizontal strata and the Pleistocene loess cover mask relief contrasts to a large extent (Fig. 2). It is only in connection with the deeply incised river valley that several narrow valleys and ravines formed. The largest valley of this kind is the gorge of the Dnister with large far-swung meanders carved up to 200 m below the surface of the Podolian Plate. Further east where it is rather arid, the ***steppe*** type of ravines – so-called ***Balki*** – evolved. These ravines are often formed as dry ***floodplain*** valleys and can reach lengths of up to 40 km. Smaller forms of steppe ravines – ***Ovragi*** – often flow laterally into the Balki, wherefore quite often a branched ravine system developed. Its genesis is attributable to pre-existing relief structures, which were overlaid by current gully ***erosion*** of unconsolidated loess as a consequence of heavy rainfall events or thawing (Kovalchuk 2000a). Rocky zones, like those occurring at the steep slopes of valleys normally consist of Cretaceous limestone. Their subsurface existence can be reconstructed by geomorphologic phenomena of the covering bedrock, above all by ***dolines*** and dry valleys (Kubijovych 1993a). The ***geomorphogenesis*** of the loess-covered and slightly undulated landscape in particular occurred via succession from flat knolls and shallow dells (frequently mapped as dry valleys), which were formed under the periglacial conditions of the Pleistocene.

Genesis of the Carpathian mountains

The young folded mountains of the Carpathians in the south of Western Ukraine are geologically in complete contrast to the Precambrian Podolian Plate (Fig. 1). They are a component of the Alpine folded mountain belt. Comparable to the Alps, they consist of a crystalline central zone and a succession of Palaeozoic to Mesozoic overlying rocks. In the Cretaceous period, a folding and thrust faulting of the central zone onto the overlying rock began. The main phase of elevation took place during the younger Tertiary period, starting from the Oligocene, so that, instead of widespread limestones and ***dolomites*** dominant in the Alps, it is the Cretaceous and Palaeogene ***flysch*** which forms the main component of the Carpathian Mountains (Demek 1983). Both, the rocks of the crystalline zone as well as the flysch beds, were pushed several kilometres in northern direction as overlying rocks, one above the other, before the area was divided by younger tectonic movements into a mosaic of block faults. From the central ranges of the flysch outward to the mountain edge, the narrow ***Magura*** and ***Silesi*** overthrust sheets, consisting of Tertiary sandstones, follow. The adjacent Skole or Tarceau overthrust sheet in the north contains rocks from the epochs of the Lower Cretaceous to the Oligocene (Fig. 1). The ***sandstones*** of these overlying strata were pushed at least 10 km onto the following overthrust sheet, the ***marls,*** sandstones and conglomerates of which gradually change into the Miocene molasse of the Precarpathians without further thrust faults (Schönenberg & Neugebauer 1994).

The geological arrangement of the Carpathian Mountains in Ukraine into several overthrust sheets is reflected by the arrangement of the mountain chains and parallel V-shaped valleys (Fig. 1). Exposed to the exogenous denudation, the flysch rocks are relatively weak. It is assumed that already in the Middle Miocene, between the dominating elevation phases, two peneplains were formed whose remains may, e.g., be located in the flat summit regions of the ***Polonyna*** mountains between 900 and 1,000 m a.s.l. (Cys' 1961, 1965; Franz 1973). Due to the fact that no correlate decomposition strata were found, it has been speculated recently that they were not formed from the peneplains but rather by flattening due to uplifting blocks or on ***geological*** horsts (Demek 1983).

During Pleistocene, the Carpathian Mountains were glaciated only locally in the surroundings of the highest mountain ranges (e.g. Chornohora

massif), where remainders of the appropriate geomorphologic inventory such as cirques and short U-shaped valleys can be found.

In the largest part of the Ukrainian Carpathian Mountains, apart from the ***periglacial*** over-forming through ***cryoplanation*** and ***solifluction,*** a fluviatile denudation relief was predominant due to the fact that the high ***erosion potential*** of the rivers incised deep V-shaped valleys (Fig. 2). In addition to that, the spectrum of mass movements with scars, debris cones and talus slopes acted as an important agent of ***landscape formation*** (Nawratil 1973).

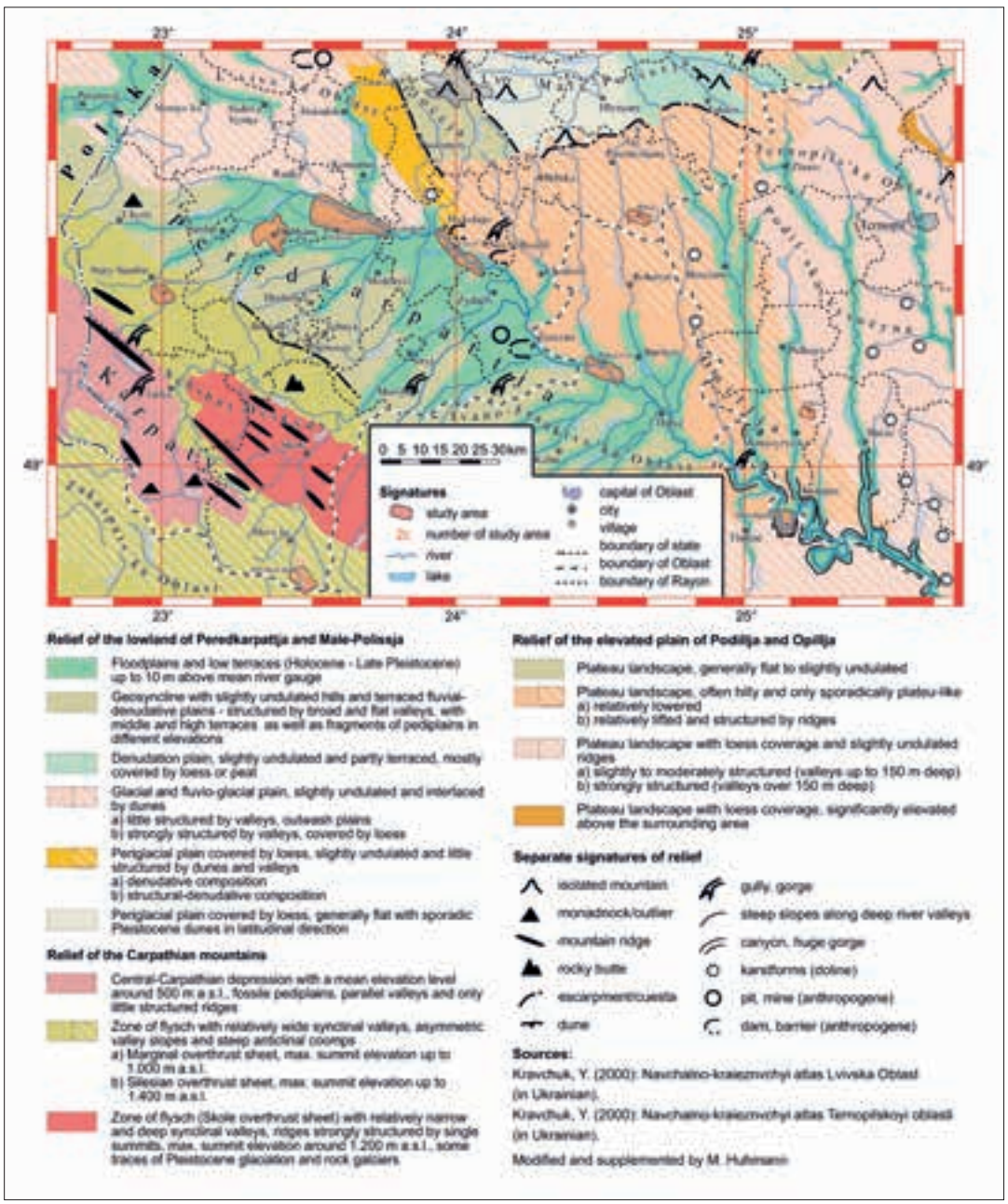


Fig. 2: Geomorphology and landscape pattern of the Western Ukraine

Formation of the Precarpathians

Between the two large geologic-geomorphologic units of the Carpathians and the Podolian Plate lie the Precarpathians. They got their current shape during Upper Miocene (Sarmat) and the Pleistocene by slight uplift and parallel fluvial incision (Fig 1; Demek 1983). The starting point of their genesis was the subsidence of the geosyncline and the resulting accumulation of sediments during intensive folding procedures in the course of the Alpine orogeny. Mainly under shallow marine up to brackish conditions, thick salt deposits were formed between pelitic layers (mainly sandy argillaceous schists; Vyalov et al. 1981). In the centre of the Precarpathians, the molasse reaches a thickness of several thousand metres, decreasing quickly finally striking out against the Podolian Plate (Schönenberg & Neugebauer 1994).

Due to the ongoing uplift of the Carpathians up to 3 mm/year until today (Kvasnytsya 1994), parts of the molasse were overlaid by the flysch of the Carpathians. They also slightly grew particularly within their southern ranges and tilts. The following ***fluvial erosion*** of the large rivers of the Carpathians (e.g. Stryi, Limnytsia), crossing the area in straight courses led to a sequence of flat, hilly ridges and broad river valleys (Fig. 2). Due to this tilting the Dnister, running NW-SE, has been shifted forward the ascending Podolian Plate along the northern delineation of the Precarpathians (Fig. 2; Huhmann & Brückner 1999, 2000).

The Pleistocene inland ice reached the area of the Precarpathians west of a line Lviv-Sambir with a glacier lobe only during the Moskva ice age, so that the actual Precarpathians must be ranked among the periglacial area in the Late Pleistocene epoch (Bohutskyi et al. 2002). Apart from the repeated deposition of loess on the flat hills of the ridges, the fast and profound climatic changes left an extensive sequence of up to eight Pleistocene step ***terraces*** along the river valleys (Kubijovych 1993b; Yermolenko 1962). The Late Quaternary and Holocene landscape evolution of the Dnister river valley is described in another chapter of this volume (🕮 *Late Pleistocene and Holocene Landscape Evolution of the Upper Dnister Valley;* see also Huhmann 2005; Huhmann et al. 2004).

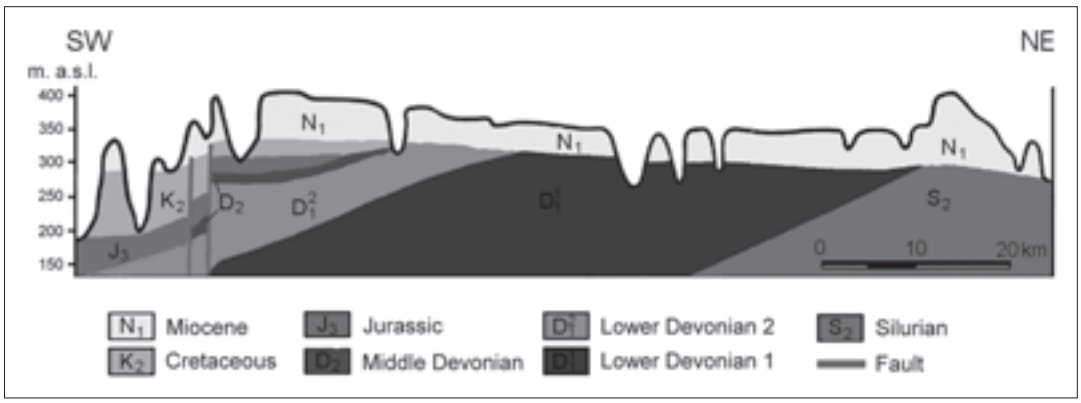


Fig. 3: Geological cross-section of the Podolian Plate from SW to NE direction, from the valley of the Dnister through the regions of Monastyryska and Skalat (Source: Kravchuk 1999)

Conclusions

The reason for the uniqueness of the Dnister basin is found in the multifaceted geologic and geomorphologic inventory of the Podolian Plate, the Carpathian Mountains and the Precarpathians. The current appearance of the basin reflects an enormous spectrum of different landscape elements. The background is a dramatic geological and geomorphological history since the earliest ***geological ages.*** The latest radical modification in Western Ukraine was caused by the ***glacial*** and ***postglacial*** periods during Quaternary (Huhmann et al. 2004; 🕮 *Late Pleistocene and Holocene Landscape Evolution of the Upper Dnister Valley*). Both, geological architecture as well as glacial and postglacial geomorphologic modification are reflected in the variety of landscape features (steep mountains, flattened hills, ravines, gentle valleys, wetlands, etc.). Together with the rich inventory of very diverse soil types (🕮 *Soil Erosion: Possibilities for Soil Protection*), this has direct consequences for living and farming conditions (🕮 *Current Land Use Structure of the Upper Dnister Basin and Recent Changes in the Model Communities*). This is also reflected in the present differentiation of the land use between the small-sized and scattered arable land of the Carpathian mountains and the intensive and large-sized agriculture of the Podolian Plate.

Natural Geoecosystems of the Upper Dnister Basin

I. Kruhlov, B. Mukha and B. Senchyna

Abstract / Анотація

Природні геоекосистеми проаналізовані за допомогою середньомасштабного (1 : 250 000) цифрового геопросторового шару, створеного у середовищі географічної інформаційної системи на підставі топографічної та тематичних карт, літературних джерел та спеціальних польових обстежень. Геоекосистеми відображають взаємозв'язки між рельєфом, ґрунтоутворюючими відкладами, біокліматом, ґрунтом та потенційною природною рослинністю. Басейн Верхнього Дністра охоплює 42 типи геоекосистем, які формують п'ять макроекорегіонів. Західне Поділля (5 646 км²) є горбистою та хвилястою лесовою височиною з переважно сірими лісовими ґрунтами, в межах якої виділяємо два висотні біокліматичні пояси. Нижній пояс (~195–325 м н. р. м.) формують грабово-дубові, а верхній пояс (~325–471 м) – грабово-букові ліси. Розточчя (334 км²) – це горбиста лесова височина, розділена реліктовими піщанистими флювіогляціальними долинами. Інтервали висот (~275–397 м), а отже й біокліматичні характеристики, є близькими до попереднього регіону. Однак піщанисті ділянки зайняті сосноводубовими та сосново-буковими лісами на дерново-слабопідзолистих ґрунтах. Сян-Дністерське Передкарпаття (1 261 км²) являє собою хвилясту лесову рівнину зі широкими реліктовими флювіогляціальними долинами. Абсолютні висот коливаються у межах 245–341 м. Серед природної рослинності домінують грабово-дубові ліси на сірих лісових ґрунтах та сосново-дубові ліси на дерново-слабопідзолистих піщанистих ґрунтах. Дністер-Прутське Передкарпаття (7 321 км²) є чергуванням хвилястих давньоалювіальних височин та широких сучасних річкових долин. Три висотні біокліматичні пояси представлені грабово-дубовими (~200–350 м), ялицево-дубовими (~350–500 м) та ялицево-буковими (~500–870 м) лісами на поверхневооглеєних дерново-підзолистих, буроземно-підзолистих та гірських лісових буроземних ґрунтах. Східні Зовнішні Карпати (6 933 км²) є низькими та середніми флішовими горами. П'ять біокліматичних поясів сформовані ялицево-буковими (~330–650 м), смереково-буковими (~650–950 м), буково-смерековими (~950–1 200 м) та кедро-вососново-смерековими (~1 200–1 500 m) лісами на гірських лісових буроземах, а також субальпійським чагарниками та луками (~1 500–1 818 м) на гірських кам'янистих лучних буроземах.

Introduction

Comprehensive and coherent information on land resources serves as a basis for sustainable physical planning (e.g. McHarg 1969; Steiner 1991). A significant part of this information can be efficiently represented as a single geo-dataset of natural landscape units (natural ***geoecosystems*** – I.K.) and be used for the design of landscape visions as an important step in physical planning processes (Bastian 2000).

Much has been published in Ukrainian and Russian about the nature of the Upper Dnister Basin – landforms, ***geology, climate, hydrology, soils, vegetation, fauna,*** and natural landscapes (e.g. Herenchuk 1968, 1972, 1973, 1979; Hofstein 1962, 1979, 1995; Holubets et al. 1988; Kravchuk 1999, 2000; Shabliy et al. 1989, 1990). However, the information is often not harmonised and presented in a not spatial or loosely-spatial (in a form of fine-scale schematic maps) manner, and, thus, is hardly suitable for practical use. There are also medium-scale (1 : 200,000) digital topographic maps (Anonymous 1997) as well as paper maps on the Quaternary deposits (Chalyi 1993) and the soils (Krupskyi 1967), which are not publicly available.

The description of the Upper Dnister Basin natural geoecosystems presented here is based on a respective medium-scale (1 : 250,000) digital geodataset produced in the ***geographical information system (GIS)*** environment using the above-mentioned material as well as field observation data.

Methods

Theoretical background

There are several apparently independent and, therefore, somewhat different definitions of a geoecosystem (Bachinskiy 1989; Huggett 1995; Leser 1991; Rowe & Barnes 1994). However, all definitions recognise geoecosystems as models of real landscapes, constructed using geospatial and ecological approaches in the broad sense – as a study of structure and functioning of nature (Odum 1959). Unlike (bio)ecosystems as objects of synecology which are essentially biocentric entities, geoecosystems are studied as complex geographical formations from a more holistic (Huggett 1995; Rowe & Barnes 1994), or even abiotic (Leser 1991) perspective. Socio-economic aspects may also be integrated into geoecosystem studies (Bachinskiy 1989). The science of geoecosystems is called geoecology (Bachinskiy 1989; Huggett 1995; Leser 1991).

Developing the current definitions, a geoecosystem is interpreted as a geospatial model of genetic and/or functional interrelations between selected properties of a real landscape (Kruhlov 2005a). The landscape properties are referred to as ***geocomponents.*** A natural geoecosystem represents geospatial relations only between the selected properties of the potential (primary) natural landscape – i.e. the landscape that could have evolved if no major disturbances, including ***human impact,*** had taken place. Hence, natural geoecosystems are ideal constructions representing spontaneous equilibrium between natural geocomponents, some of which (e.g. natural vegetation) do not exist in a real cultural landscape. This concept is close to the idea of a natural terrain complex (e.g. Isachenko 1965), or of a natural area ("Naturraum") (e.g. Haase et al. 1991), and, despite certain abstraction, is of high practical significance, because it offers a reference to environmental assessment, nature conservation, and sustainable planning of land resources.

This study focusses on genetic relationships between some principal natural geocomponents: landforms, surficial rocks, topobioclimate, soils, and ***potential natural vegetation (PNV)*** – the vegetation that possibly can develop under the given edaphic and climatic conditions without human impact (Tüxen 1956). The spatial structure of such natural geoecosystems is reduced to the geomorphic component and, thus, they can be more accurately named as natural morphogenic geoecosystems (Kruhlov 2005a). Solntsev's (1960) idea about the inequality of natural landscape factors is used to model interrelations between the geocomponents. It is assumed that lithogenic components (landforms and parent rock) determine hydroclimatic components (topoclimate)

and, together with the latter, control both character and spatial pattern of the biotic components (soil cover and PNV) (Fig. 1).

The natural morphogenic geoecosystems of the Upper Dnister Basin are considered at two geospatial levels:

1. As relatively large and heterogeneous, in an ecological sense individual regions ***(ecoregions)*** formed mainly by neotectonics, which, nevertheless, reveal certain uniform spatial patterns of structure and processes;
2. As relatively small and homogeneous typological units, whose borders are predominantly shaped by exogenous geomorphic processes. In this study, the map of ecoregions provides a general frame for the description of the lower-rank typological units.

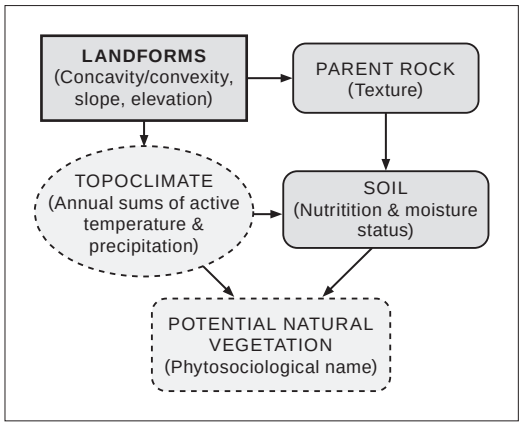


Fig. 1: Connections between components of a natural morphogenic geoecosystem

Materials and techniques

To prepare a 1 : 250,000 map of the Upper Dnister Basin natural morphogenic geoecosystems, the following data sources were used:

1. 1 : 200,000 digital topographic map (Anonymous 1997);
2. 1 : 200,000 paper map of the Quaternary (Chalyi 1993);
3. 1 : 200,000 paper soil map (Krupskyi 1967);
4. Landsat ETM+ satellite scene of May 2000;
5. Numerous published texts and maps on geology, geomorphology, climate, hydrology, soils, vegetation, and natural landscapes of the Upper Dnister Basin (mentioned in the text);
6. Field observations on the dependencies between landforms, soils, vegetation, and cultural elements were made according to the modified methodology of Herenchuk et al. (1975); Miller (1974) on 204 sites in different parts of the Upper Dnister Basin during warm periods between spring and autumn in 2002 and 2003.

The map was compiled in a GIS via geoecological modelling. The essence of the geoecological modelling was to make a geospatial interpretation of the non-spatial, or loosely-spatial, knowledge on relationships between PNV, soil, and climate (published in the regional literature) using properly georeferenced data on topography and surficial rocks. ArcGIS and Erdas Imagine software was used for the digital processing, all geospatial data were referenced (WGS 84, UTM). The modelling consisted of the three main components (Kruhlov 2004, 2005b):

1. Delimitation of lithomorphic units based on topography (landforms) and surficial geological deposits (soil parent rock);
2. Bioclimatic characterisation of the landforms;
3. Determination of the biotic components (soil and PNV) for the landforms based on relationships between the parent rock and the bioclimate.

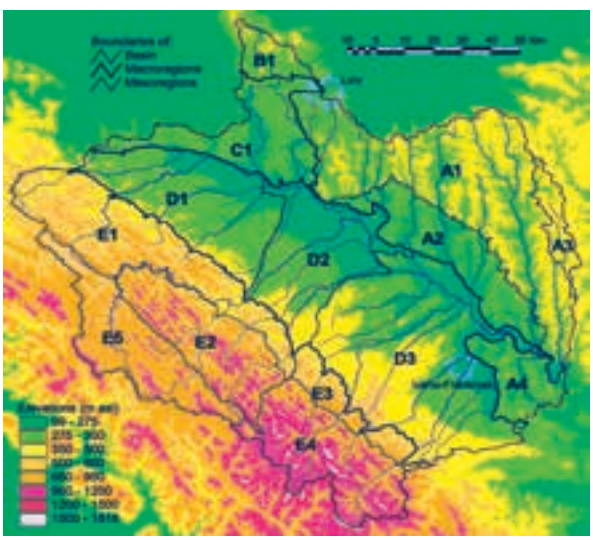
The borders of the macroecoregions and of the smaller regions with the uniform spatial distribution of landforms and surficial geological deposits were delineated and automated into the GIS. The borders of smaller landforms for relatively dissected ***interfluves*** were generated in the GIS environment via processing of the digital elevation model (DEM). This resulted in the geo-dataset of lithomorphic units which reveal information about landforms, geomorphic processes and the surficial deposits.

The topobioclimatic modelling included stratification of the DEM into altitudinal bioclimatic zones using data on average elevation spans of natural vegetation belts (Holubets & Milkina 1988; Kireev 1977; Sheliag-Sosonko 1985). Bioclimatic zones were characterised by annual precipitation (mm) and ***active air temperature*** (above 10 °C; Andrianov 1968, 1979). Then the average bioclimatic characteristics were calculated for each lithomorphic unit using a GIS zonal function. Narrow valleys and valley bottoms were excluded from the altitudinal topoclimatic characterisation owing to specific conditions caused by higher humidity and temperature inversions (🕮 *Topoclimate of the Upper Dnister Basin: Consequences for Crop Cultivation*).

The determination of the natural soils and PNV was based on the knowledge about their ecological relationships with the parent rock and topobioclimate, obtained from the literature, the soil map, and the field studies. The soils were given Ukrainian (Vernander & Tutunnyk 1986) and international (ISSS-ISRIC-FAO 1998) names. Information about soils afforded estimation of the nutrient and moisture status (edaphic conditions). The PNV was estimated at the level of the ***sub-formation*** (Holubets & Malinovskiy 1967). The non-spatial ecological models were coupled with the geo-dataset of the lithomorphic-bioclimatic units. Field observations from 97 sites carried out in 2002–2003 were used to verify the results of the geospatial modelling. The verification witnessed the maximum confidence of 83 % for the parent rock estimations and the minimum confidence of 79 % for the PNV estimations. Taking into consideration the map generalisation peculiarities, the overall confidence can be estimated even as somewhat higher.

Regional descriptions

Considering the existing geomorphological and landscape regionalisations (Herenchuk 1972, 1973, 1979; Kravchuk 2000; Mukha 2003; Shabliy et al. 1989, 1990), five natural ***macroecoregions*** (Tab. 1 and 2) – divided into smaller individual units (***mesoecoregions;*** Tab. 3) – can be delineated within the Upper Dnister Basin (Fig. 2 and 3; 🛈 IV (2) Fig. 1).



A. *Western Podillia:* hilly and wavy loess upland with natural forests (beech, oak-hornbeam); **A1**. High Opillia; **A2**. Low Opillia; **A3**. Koropets-Seret ***Interfluve;*** **A4**. Pokuttia

B. *Roztochia:* hilly loess upland with sandy relict fluvioglacial valleys covered with forests (beech, pine-oak); **B1**. Southern Roztochia

C. *San-Dnister Precarpathians* (Peredkarpattia): wavy loess plains with vast flat relict fluvioglacial valleys once with oak forests; **C1**. Vyshnya-Dnister ***Interfluve***

D. *Dnister-Prut Precarpathians* (Peredkarpattia): sequence of wavy old-alluvium uplands separated by vast alluvial valleys once with oak and oak-fir forests; **D1**. Upper Dnister Precarpathians; **D2**. Stryi Precarpathians; **D3**. Bystrytsyia-Prut Precarpathians

E. *Eastern External Carpathians* (Karpaty): low and middle flysch mountains with beech, fir, and spruce forests; **E1**. Dnister Beskydy; **E2**. Skole Beskydy; **E3**. Marginal Gorgany; E4. Gorgany; **E5**. Verkhovyna.

Fig. 2: Ecoregions of the Upper Dnister Basin

Tab. 1: Some morphometric characteristics of the Upper Dnister Basin macroecoregions

Region	Area [km²]	Elevation			Mean slope
		mean	maximum	minimum	
Western Podillia	5,646	325 m	Kamula – 471 m	195 m	3.3°
Roztochia	334	326 m	Bulava – 397 m	275 m	2.0°
San-Dnister Precarpathians	1,261	283 m	341 m	245 m	0.8°
Dnister-Prut Precarpathians	7,321	319 m	Kleva – 870 m	200 m	1.3°
Eastern External Carpathians	6,933	761 m	Syvulya – 1,818 m	330 m	10.4°
Whole Upper Dnister Basin	**21,493**	**461 m**	**1,818 m**	**195 m**	**4.7°**

Tab. 2: Bioclimatic altitudinal belts of the Upper Dnister Basin macroecoregions

Short designations of bioclimatic belts	Elevation [m a.s.l.]	Annual sum of		Dominating potential natural vegetation
		active T [°C]	precipitation [mm]	
Western Podillia, Roztochia and San-Dnister Precarpathians				
Warm I	195–325	2,400–2,600	600–700	*Carpineto-Querceta*
Warm II	325–471	2,300–2,500	650–800	*Carpineto-Fageta*
Dnister-Prut Precarpathians				
Warm III	200–350	2,300–2,600	600–800	*Carpineto-Querceta*
Moderately Warm	350–500	2,100–2,400	700–900	*Abieto-Querceta*
Moderately Cool	500–870	1,700–2,200	800–1,000	*Abieto-Fageta*
Eastern External Carpathians				
Moderately Cool	330–650	1,700–2,200	800–1,000	*Abieto-Fageta*
Cool	650–950	1,400–1,900	900–1,100	*Piceeto-Fageta*
Very Cool	950–1,200	1,000–1,500	1,000–1,200	*Fageto-Piceeta*
Moderately Cold	1,200–1,500	600–1,100	1,100–1,300	*Pineto cembrae-Piceeta*
Cold	1,500–1,818	<700	1,200–1,400	*Piceeto-Pineta mugo*

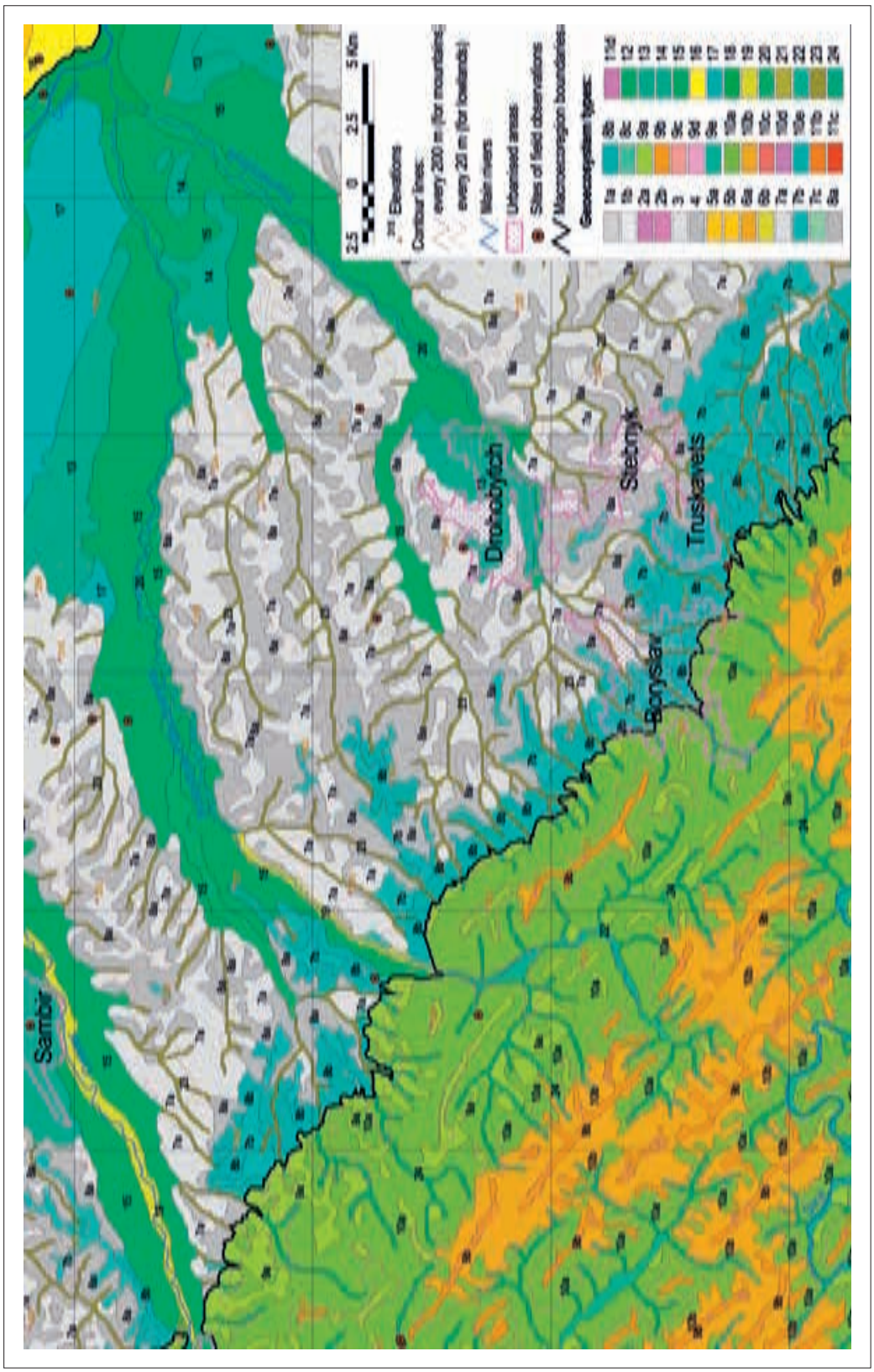


Fig. 3: Section of the 1 : 250,000 map of geoecosystems (explanations to geoecosystem type in Tab. 3)

Tab. 3: Geoecosystem types of the Upper Dnister Basin (legend of the map)

Type	Area [ha]	Landforms	Surface (parent) rock	Bioclimate	Soils	Nutrition status	Moisture status	Potential natural vegetation
Ecoregions Western Podillia, Roztochia and San-Dnister Precarpathians								
6a	205,994	Moderate & steep slopes (6–30°) – deluvial & defluctional	Eluvial-deluvial loam & loess-like loam	Warm I	Umbric Albeluvisol & Albic Phaeozem	Oligo-mesotrophic & mesotrophic	Mesic	*Carpineto-Querceta*
6b	161,304			Warm II	Umbric Albeluvisol & Rendzic Leptosol	Mesotrophic		*Carpineto-Fageta*
5a	96,773	Watershed surfaces & gentle slopes (0–6°) – deluvial	Eluvial (eolian)-deluvial loess-like loam	Warm I	Albic Phaeozem	Eutrophic	Mesic & hydric	*Carpineto-Querceta*
5b	98,300			Warm II	Umbric Albeluvisol & Albic Phaeozem	Mesotrophic & eutrophic		*Carpineto-Fageta & Carpineto-Querceta*
3	20,252		Eluvial-deluvial loess-like sandy loam	Warm I	Haplic & Umbric Albeluvisol	Oligo-mesotrophic & mesotrophic		*Carpineto-Querceta*
4	4,813	Moderate slopes (6–20°) – deluvial					Mesic	
1a	10,984	Watershed surfaces & gentle slopes (0–6°) – deluvial	Eluvial-deluvial sand		Haplic Albeluvisol	Oligo-mesotrophic	Mesic & hydric	*Pineto sylvestrae-Querceta*
1b	3,271			Warm II			Mesic	*Pineto sylvestrae-Fageta*
2a	5,850	Moderate slopes (6–20°) – deluvial		Warm I			Xeromesic & mesic	*Pineto sylvestrae-Querceta*
2b	1,782			Warm II				*Pineto sylvestrae-Fageta*
12	12,616	Alluvial low terraces, gently sloping (0–3°)	Eluvial-deluvial loess-like loam	Warm I	Umbric Albeluvisol & Albic Phaeozem	Mesotrophic & eutrophic	Mesic & hydric	*Fraxineto-Querceta*
21	55,579	Alluvial valley bottoms	Alluvial loam & peat	Topoclimate of valleys	Haplic & Histic Fluvisol & Sapric Histosol	Eutrophic	Hydric & ultrahydric	*Alneto glutinosae-Querceta*
23	65,627	Alluvial valleys with deluvial & delapsial slopes	Deluvial & alluvial loam		Albeluvisol, Phaeozem & Fluvisol	Mesotrophic & eutrophic		*Fraxineto-Querceta & Alneta glutinosae*
Ecoregion Dnister-Prut Precarpathians								
7a	92,128	Watershed surfaces & gentle slopes (0–6°) (alluvial high terraces) – deluvial	Eluvial-deluvial silt loam	Warm III	Albeluvisol stagnic	Mesotrophic	Mesic & hydric	*Carpineto-Querceta*
7b	52,746			Moderately Warm				*Abieto-Querceta*