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Socio-Economic Analysis of the Carpathian Area

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1.1 Physical geographic features

The Carpathian Mountains are the Eastern wing of the Great Central Mountain System of Europe, curving on the territory of eight Central and Eastern European countries (Austria, Czech Republic, Slovakia, Hungary, Poland, Ukraine, Romania and Serbia). The Carpathians begin on the Danube near Bratislava. They surround Transcarpathia and Transylvania in a large semicircle, sweeping towards the south-west, and end on the southern bank of the Danube near the Iron Gate, in Serbia. The total length of the Carpathians is over 1500 km, and the width of the mountain chain varies between 12 km and 500 km. The greatest width of the Carpathian corresponds with its highest altitudes. The system attains its greatest breadth in the Transylvanian plateau and in the meridian of the Tatra group (the highest range with Gerlachovský štít, at 2655 m in Slovak territory near the Polish border). It covers an area of 190,000 km^2, and, after the Alps, it is the most extensive mountain system in Europe.

Although commonly referred to as a mountain chain, the Carpathians do not actually form an uninterrupted chain of mountains. Rather, they consist of several orographically and geologically distinctive groups, presenting as great a structural variety as the Alps. The Carpathians, which only in a few places attain an altitude of over 2500 m, mostly lack the bold peaks, extensive snow-fields, large glaciers, high waterfalls, and numerous large lakes that are common in the Alps. No area of the Carpathian range is covered with snow year-round, and there are no glaciers. The Carpathian at their highest altitude are only as high as the Middle Region of the Alps, with which they share a common appearance, climate and flora.

The Carpathians are separated from the Alps by the Danube. The two ranges meet only at one point: the Leitha Mountains at Bratislava. The Danube also separates the Carpathians from the Stara Planina, or Balkan Mountains at Orşova, Romania. The valley of the March (Morava) and Oder separates the Carpathians from the Silesian and Moravian chains, which belong to the middle wing of the great Central Mountain System of Europe. Unlike the other wings of the system, the Carpathians, which form watershed between the northern seas and the Black Sea, are surrounded on all side by plains, namely the Pannonian Plane on the southwest, the plane of the Lower Danube on the south, and the Galician Plain on the northeast.

1.2 The analysed area

For the purposes of the analysis and strategy building in the Carpathian region, a wider area have been delineated, as Carpathian programme area. This delineated area comprises much larger area (470 thousand km^2) than the area of the Carpathian mountains (190 thousand km^2). It covers also the forelands of the mountain chain. Furthermore, it is delineated according the administrative regions of the Carpathian area (NUTS2 regions in Austria, Poland and Ukraine, NUTS3 regions in the Czech Republic, Hungary, Romania and Serbia) in order to have a larger data base for analysis and to enable the participation of regional governments with their whole administrative area in the project. According to this delineation, the whole territory of Slovakia is regarded as part of the Carpathian region (*Figure 1*).

This larger area has a population of nearly 53 million, which is comparable to the population size of Britain, France and Italy in Europe. It is about 7.6% of the European population, and somewhat less than 5% of the European territory (*Table 1*).

The breakdown of the Carpathian region according to countries is the following.

The Carpathian area has a rather stormy history. Hundred years ago, in 1907, 80 percent of the Carpathian region belonged to the Austro-Hungarian Empire. 12.7 percent belonged to Romania, 3.9 percent to Serbia, 2.8 percent to the German Reich, and 0.6 percent to the Russian Empire. After the First World War, the political map of the area changed radically. Romania's share increased to 38 percent, that of Czechoslovakia to 17.9 percent, Poland's share to 19.5 percent, that of Serbia (Yugoslavia) to 7.1 percent. Hungary's share from the Carpathian area delineated above decreased to 12.2 percent, that of Austria to 5.3 percent.

After the Second World War, the Soviet Union became a Carpathian country, with a share of 12.5 percent, which was transferred from Poland, Czechoslovakia and Romania, respectively. After the dissolution of the Soviet Union, this area was "inherited" by the independent Ukraine. Serbia is the heir of the Yugoslav Carpathian territory, while the Czechoslovak area is shared by the Czech Republic and Slovakia, with the dominant part in Slovakia.

1.3 Demography

The average density of population in the Carpathian region is 120/km^2. Behind this average, however, the differences are very large. In the proper mountains, where the economic carrying capacity is rather low, the density of population is 10–25/km^2. In the forelands of the mountains, it is rather high, over 150/km^2.

Figure 1

Map of the Carpathian development region

Legend: AT11 – Burgenland; AT12 – Niederösterreich; AT13 – Wien; CZ062 – Jihomoravský; CZ071 – Olomoucký; CZ072 – Zlínský; CZ080 – Moravskoslezský; HU101 – Budapest; HU102 – Pest; HU212 – Komárom-Esztergom; HU221 – Győr-Moson-Sopron; HU311 – Borsod-Abaúj-Zemplén; HU312 – Heves; HU313 – Nógrád; HU321 – Hajdú-Bihar; HU322 – Jász-Nagykun-Szolnok; HU323 – Szabolcs-Szatmár-Bereg; HU332 – Békés; HU333 – Csongrád; PL21 – Malopolskie; PL22 – Slaskie; PL32 – Podkarpackie; PL33 – Swietokrzyskie; RO111 – Bihor; RO112 – Bistriţa-Năsăud; RO113 – Cluj; RO114 – Maramureş; RO115 – Satu Mare; RO116 – Sălaj; RO121 – Alba; RO122 – Braşov; RO123 – Covasna; RO124 – Harghita; RO125 – Mureş; RO126 – Sibiu; RO211 – Bacău; RO214 – Neamţ; RO215 – Suceava; RO222 – Buzău; RO226 – Vrancea; RO311 – Argeş; RO313 – Dâmboviţa; RO316 – Prahova; RO321 – Bucureşti; RO322 – Ilfov; RO412 – Gorj; RO413 – Mehedinţi; RO415 – Vâlcea; RO421 – Arad; RO422 – Caraş-Severin; RO423 – Hunedoara; RO424 – Timiş; RS03 – North Banat; RS05 – Central Banat; RS07 Grad Beograd; RS08 South Banat; RS11 – Podunavski; RS12 – Branicevski; RS13 – Borski; RS15 – Pomoravski; RS20 – Nisavski; RS21 – Zajecarski; SK010 – Bratislavský kraj; SK021 – Trnavský kraj; SK022 – Trencianský kraj; SK023 – Nitrianský kraj; SK031 – Zilinský kraj; SK032 – Banskobystrický kraj; SK041 – Presovský kraj; SK042 – Kosický kraj; UA01 – Zakarpattia Oblast; UA02 – Lviv Oblast; UA03 – Ivano-Frankivsk Oblast; UA04 – Chernivtsi Oblast.

Table 1

Main indicators of the Carpathian area (2004)

Country	Carpathian area km^2	Carpathian population thousands	As a percentage of the		As a percentage of the	
			country's area	country's population	Carpathian area	Carpathian population
Austria	23,558	3,373	28.1	41.6	5.3	6.3
Czech Republic	21,723	3,632	27.5	35.6	4.9	6.8
Hungary	54,322	7,286	58.3	72.9	12.2	13.6
Poland	45,514	10,138	14.6	26.3	10.2	18.9
Romania	165,013	13,920	69.5	62.1	36.9	26.0
Serbia	31,567	3,568	35.7	35.2	7.1	6.7
Slovakia	49,034	5,379	100.0	100.0	11.0	10.1
Ukraine	55,895	6,217	9.3	12.8	12.5	11.6
Total	446,626	53,513	28.4	34.9	100.0	100.0

Source: National statistical yearbooks.

It is especially high along the external "market line" (a chain of cities), where it is more than 200/km^2. But this two areas, showing different densities of population cannot be regarded separately. The economic base for a significant share of the population in the densely populated area are the mountains (and their products). On the other hand, the population in the mountains would be even smaller without the demand of the population in the forelands for their services and products (*Table 2*).

The development of the size of the population is the result of birth and death rates and migratory movement of the population.

During the 20th century, birth rates in the Carpathian area were rather higher, higher than in other areas of Central Europe. The reasons for this were different: rural way of life, deeper religiosity, but also lower educational level. However, in the last decades, birth rates decreased radically, more than the respective national averages. They are still higher, than in the surrounding plain areas, but the difference is much smaller than before.

The highest birth rates can be found in the proper mountainous areas in the Northeast Carpathians (in Romania, Poland, Slovakia and the Ukraine). The lowest birth rates are in Austria, Hungary and – interestingly – also in Poland and Slovakia (*Table 3*).

Table 2

The highest and lowest birth rates in the Carpathian area (2004)

The 10 NUTS3 regions with the highest birth rates in the Carpathian area	Birth rates	The 10 NUTS3 regions with the lowest birth rates in the Carpathian area	Birth rates
Suceava (RO)	12.4	Südburgenland (AT)	7.6
Zakarpattia (UA)	12.4	Mittelburgenland (AT)	7.8
Prešovský kraj (SK)	12.2	Miasto Kraków (PL)	8.1
Košický kraj (SK)	11.8	Békés (HU)	8.1
Covasna (RO)	11.7	Centralny Sląski (PL)	8.2
Nowosądecki (PL)	11.5	Częstochowski (PL)	8.2
Harghita (RO)	11.1	Weinviertel (AT)	8.2
Maramureş (RO)	11.0	Nitrianský (SK)	8.3
Satu Mare (RO)	11.0	Wiener Umland/Nordteil (AT)	8.3
Mureş (RO)	11.0	Nordburgenland (AT)	8.3

Source: Eurostat.

Table 3

The highest and lowest death rates in the Carpathian area (2004)

The 10 NUTS3 regions with the highest death rates in the Carpathian area	Death rates	The 10 NUTS3 regions with the lowest death rates in the Carpathian area	Death rates
Nógrád (HU)	15.0	Prešovský kraj (SK)	8.1
Sălaj (RO)	14.5	Rzeszowsko-Tarnobrzeski (PL)	8.1
Békés (HU)	14.4	Nowosądecki (PL)	8.1
Arad (RO)	14.2	Rybnicko-Jastrzębski (PL)	8.2
Borsod-Abaúj-Zemplén (HU)	13.8	Mostviertel-Eisenwurzen (AT)	8.7
Mehedinți (RO)	13.8	Bielsko-Bialski (PL)	8.8
Heves (HU)	13.7	Miasto Kraków (PL)	8.9
Jász-Nagykun-Szolnok (HU)	13.7	Krakowsko-Tarnowski (PL)	9.0
Bihor (RO)	13.7	Žilinský kraj (SK)	9.2
Csongrád (HU)	13.6	Krośnieńsko-Przemyski (PL)	9.2

Source: Eurostat.

The regions with the highest death rates are exclusively in Hungary and Romania – mostly in Hungary – and in the southern part of the Carpathian area. The regions with the lowest death rate are exclusively in Poland and Slovakia – mostly in Poland – and in the northern part of the Carpathian area. Low death rates are mostly due to the younger age structure of the population in this regions, due to the former higher birth rates.

Natural increase and decrease is the difference between birth rate and death rate. Considering, that death rates are even more differentiated in the area than birth rates, the ranking according birth rates and natural increase differs substantially.

As it can be seen, natural increase is more in correlation with the death rates than with birth rates. Natural increase is highest in the Polish and Slovak regions, lowest in the southern Hungarian and Romanian regions.

What is interesting, that is the contrast between Vienna and Budapest. While Vienna belongs to the ten regions with the highest natural increase, Budapest belongs to the ten regions with the lowest natural increase in the Carpathian area. Vienna has both higher birth rate and lower death rate than Budapest.

It has to be noted that even the highest natural increase figures shown in *Table 4* are rather low in international comparison. The dominant trend in the Carpathian area is natural decrease. Out of the 88 NUTS3 regions of the Carpathian area, only in 23 was natural increase registered, in the other 65 region natural population movement had a negative balance.

Table 4

The highest natural increase and decrease in the Carpathian area (2004)

The 10 NUTS3 regions with the highest natural *increase* in the Carpathian area	Natural increase	The 10 NUTS3 regions with the largest natural *decrease* in the Carpathian area	Natural decrease
Prešovský kraj (SK)	4.1	Békés (HU)	–6.3
Nowosądecki (PL)	3.4	Nógrád (HU)	–5.8
Košický kraj (SK)	2.2	Arad (RO)	–5.0
Mostviertel-Eisenwurzen (AT)	1.9	Csongrád (HU)	–4.8
Rzeszowsko-Tarnobrzeski (PL)	1.7	Mehedinţi (RO)	–4.7
Suceava (RO)	1.6	Budapest (HU)	–4.7
Žilinský kraj (SK)	1.2	Heves (HU)	–4.7
Rybnicko-Jastrzębski (PL)	1.1	Jász-Nagykun-Szolnok (HU)	–4.2
Krośnieńsko-Przemyski (PL)	0.6	Sălaj (RO)	–4.1
Wien (AT)	0.6	Borsod-Abaúj-Zemplén (HU)	–3.8

Source: Eurostat.

This natural population movement is modified by the migration. The dimension of migration is substantially larger than that of natural changes, therefore its impact on the number of population in the individual regions is substantially more important:

The largest immigration can be experienced in the surrounding agglomeration of two big cities: Vienna (Wiener Umland/Nordteil, Wiener Umland/Südteil, Sankt Pölten, Nordburgenland) and Budapest (Pest county, Komárom-Esztergom county). Significant is the inflow of migrants in Vienna itself (while in Budapest a substantial out migration can be experienced). Substantial is the immigration in Hungary in Győr-Moson-Sopron and Csongrád counties (to the last one mainly from the neighbouring countries Serbia and Romania), and to Kraków and its surrounding.

Concerning out-migration, the NUTS3 regions of two countries are among the top 10: Romania, and – surprisingly – Austria.

The regions with the highest our-migration figures indicated in *Table 5* are not the less developed agricultural counties, but the industrialised ones (Hunedoara, Sibiu, Braşov, Caraş-Severin and Timiş). It is partly the consequence of the collapse of industrial plants established in the socialist period. On the other hand, skilled, more mobile workers of these counties are those, who can find work in other regions, especially abroad.

Table 5

The largest net migration in the Carpathian area (2000–2004)

The 10 NUTS3 regions with the largest net inflow of migrants in the Carpathian area	Per 1000 inhabi-tants	The 10 NUTS3 regions with the largest net outflow of migrants in the Carpathian area	Per 1000 inhabi-tants
Wiener Umland/Nordteil (AT)	28.5	Hunedoara (RO)	–14.1
Pest county (HU)	20.2	Braşov (RO)	–12.9
Nordburgenland (AT)	10.2	Waldviertel (AT)	–12.4
Wien (AT)	9.3	Sibiu (RO)	–11.7
Győr-Moson-Sopron (HU)	9.1	Caras-Severin (RO)	–10.0
Wiener Umland Südteil (AT)	7.7	Satu Mare (RO)	–9.6
Sankt Pölten (AT)	7.4	Bacau (RO)	–9.5
Komárom-Esztergom (HU)	5.6	Harghita (RO)	–9.5
Csongrád (HU)	5.5	Timiş (RO)	–8.3
Krakowsko-Tarnovski (PL)	3.4	Weinviertel (AT)	–8.1

Source: Author's construction.

In Austria, Weinviertel and Waldviertel are the less developed NUTS3 regions of Austria, their GDP per capita is only one third of that of Vienna. They are in peripheral situation and the opening of the borders has not created sufficient opportunities so far. But the main reason for migration should be their relative vicinity to one of Europe' most prosperous regions: Vienna.

In a longer historical perspective: the proper Carpathian area was, since the 19th century, one of the main sources of European emigration. The restricted economic carrying capacity of the mountainous areas and the high population growth resulted in very high emigration figures shown in *Table 5*. The numbers of emigration statistics of Eastern Slovakia, Galicia, Szeklerland at the beginning of the 20th century were comparable with the respective figures of Britain and Ireland. A part of this emigration was of temporary character. Slovak workers, for example, worked for some years in the USA and then returned to their home country with their savings.

But anyway, because of these large emigration flows, the number of population did not increase at a rate, which could have been supposed based on the high birth rates. In contrast: there are regions, where the population is less than a century ago. Besides voluntary migration, war, forced re-settlement and the holocaust also contributed to the slower growth or even decrease of population in some areas (for example in Galicia and in the Banat).

1.4 Ethnic and religious affiliations

There are 8 countries in the Carpathian region, so its population is divided between different nations and ethnic groups. But even within the individual countries, the population is of multiethnic character. There are Hungarians and Ukrainians in Slovakia, Ukrainians and Germans in Poland, Romanians, Slovaks, Hungarians, Poles, Russians and Germans in the Ukraine, Hungarians, Germans, Ukrainians and Serbs in Romania, Romanians, Germans, Slovaks and Serbs in Hungary, Romanians, Hungarians, Slovaks in Serbia, Croatians in Austria and Poles in the Czech Republic in the Carpathian area. Roma population is spread in the whole Carpathian region, their number in the whole Carpathaian region is more than 2,5 million.

But even Ukrainian population in the Carpathians is divided into different ethnic groups. There are Rusyns, Lemkos, Bojkos and Hutsuls, all living in the Carpathian Mountains. Mountain chains divided and isolated them from each other, therefore they could develop their own dialects and ethnic identities. In South Poland, in the Carpathians live the Górals, whose language is based on Polish, but contains many words from the Slovak and Vlach languages. The Szeklers in the Eastern Carpathians speak Hungarian, but their origin is different from the other

Hungarians. Another Hungarian group, the "Csángos", lives in the Eastern side of the Carpathians, in Moldavia. Because of the long time of isolation, a substantial part of Csángos have lost already their Hungarian language and speak Romanian. The "moți" in the Apuseni Mountains speak Romanian, and regard themselves Romanians, but supposedly they have also other origin than the other Romanians. Many Czech citizens in the Czech Carpathian region regard themselves as Moravians or Silesians. Summarising: there is a very colourful ethnic mosaic in the Carpathians.

The composition of the Carpathian population according to religious affiliation is also diversified. The majority of the Polish, Slovak, Czech, Austrian and Hungarian population is Roman Catholic. Nevertheless, among those Hungarians, who live in the Carpathian region, the majority is Protestant (Calvinist). A minority of the Slovaks and Germans in Southern Transylvania are Lutherans. A substantial minority of the Szeklers belongs to the Transylvanian Unitarian Church. The larger part of Romanians and Serbs are Eastern Orthodox Christians.

The Eastern Catholic Church (or the Greek Catholic Church) has a special significance in the Carpathian region, because its adherents in Europe live almost exclusively in the North-Eastern or Eastern Carpathian area. Ethnically, they are mostly Ukrainians and Romanians but there are also Slovaks and Hungarians. Originally, they were Orthodox Christians, but the Polish King in 1595 (Brest), the Habsburg Emperor in 1696 (Uzhgorod) persuaded them to enter into Union with Rome, while retaining their rites and customs (for example married priests). After Russia (and later the Soviet Union) annexed this area, the Greek Catholic Chirch was eliminated, and its adherents were reorientated to the Orthodox Church. Similar measures were taken in Romania, Czechoslovakia after World War II. After 1990 the Greek Catholic Churches have been revived in these countries and now they are competing with the Orthodox Churches for the faithful people.

Before World War II, the Carpathian area was one of the most important settlement area of Jewish people in Europe. Their number in the Carpathian area was more than 5 million. The Holocaust, emigration and natural decrease have radically reduced their presence in the area. They number hardly 100 thousand in the area.

The intensity of practising the religion – in terms of church-going – is different in the region. Religion is practiced most frequently and intensively in Poland and Slovakia. Orthodox Romanians Ukrainians and Austrian occupy a middle position. Czechs and Hungarians are the relatively less religious people.

In the last decades – in all countries of the region, although to different extent – new Religious Movements and small Churches can attract increasing number of people. The deterioration of living conditions, the collapse of earlier systems and ideals, and sometimes their charitable activities contribute to this growing number

of adherents. Interestingly, their success is larger just in mountainous regions than in other areas.

1.5 Employment

The employment situation in the Carpathian region is difficult. Some of the regions with the highest rate of unemployment are to be found in the Carpathian area. What is even more problematic, it is the very low activity rates. It means that a large part of the working age population is inactive, they do not enter at all the labour market (because they retired early or they are women in the households or they stopped to look for employment). The low GDP/capita figures are – to a substantial extent – due to these low activity rates.

Unemployment is the largest in the Polish and Slovak regions, while in respect to activity rate, the lowest figures in the whole European Union can be found in Hungary, partly in Romania (*Table 6*).

To raise this activity level to 60 percent (the level aimed at in the Lisbon strategy) needs very serious efforts in the respective regions and countries.

Table 6

The 10 NUTS3 regions with the highest unemployment rates in the Carpathian area (2004)

	NUTS3 Region	%
1.	Košický kraj (SK)	24.7
2.	Banskobystrický kraj (SK)	23.9
3.	Częstochowski (PL)	21.5
4.	Prešovský kraj (SK)	21.5
5.	Centralny śląski (PL)	19.5
6.	Nitrianský kraj (SK)	17.8
7.	Krośnieńsko-Przemyski (PL)	17.6
8.	Rybnicko-Jastrzębski (PL)	17.5
9.	Nowosądecki (PL)	16.3
10.	Rzeszowsko-Tarnobrzeski (PL)	15.9

Source: Eurostat.

Employment and activity level depends on the economic structure of the respective regions as well. High share of private small-scale agriculture can serve temporally as a buffer against unemployment. It is the case in Southeast Poland and in some parts of Romania. In the Ukraine, for a long time, unemployed and unpaid people remained on the payroll, otherwise they would have lost those social benefits which were vital for their existence. Therefore, employment statistics are not fully reliable in every country. For the time being, there is no region in the Carpathian area which would fulfil the Lisbon criteria (*Table 7*).

Table 7

The 10 NUTS2 regions with the lowest activity rates of the 15–64 years old population (2004)

	NUTS2 Region	%
1.	Észak-Magyarország (Northern-Hungary) (HU)	45.0
2.	Észak-Alföld (North-Plain) (HU)	45.6
3.	Dél-Alföld (South-Plain) (HU)	47.4
4.	Centru (RO)	50.4
5.	Vest (RO)	51.4
6.	Sud-est (RO)	51.6
7.	Nord-vest (RO)	51.9
8.	Śląskie (PL)	52.2
9.	Közép-Dunántúl (Central-Transdanubia) (HU)	53.3
10.	Nyugat-Dunántúl (West-Transdanubia) (HU)	53.7

Source: Eurostat.

The share of agriculture in employment is still very large in some countries.

There are regions in Romania, where nearly the half of the active population is engaged in agriculture. This high agricultural employment emerged after 1990, when formerly collectivized agricultural areas were privatized and many people, who have lost their jobs in industry and other non-agricultural branches of the economy, hoped to find the source of their existence in privatized agriculture. It is, however, obvious, that a large part of these small farms is not competitive in the globalized economy, so these jobs cannot be regarded as sustainable in the long run.

But too high percentage of work-force in the secondary sector (industry) cannot be either regarded as advantageous. On the one hand, it signalizes an insufficient share of services, on the other hand, in the Carpathian area, it may signalize also a need for industrial restructuring and insufficient productivity of industries.

Regions with overly high agricultural employment can be found mostly in Romania. Out of the two Polish regions (Krakowsko-tarnowski) the reason might be, that the city of Cracow is not included in the region, therefore its character is markedly rural. It is not the case in the Nowosądecki region. Additionally, this region is in the Carpathian Mountains, where conditions for agricultural production are not very favourable (*Table 8*).

Table 8

Regional specialization in the Carpathian area (2004)

	The 10 NUTS3 regions with the highest employment share in *agriculture* in the Carpathian area	%	The 10 NUTS3 regions with the highest employment share in *industry* in the Carpathian area	%
1.	Bistriţa-Năsăud (RO)	53.5	Trenčianský kraj (SK)	48.4
2.	Dâmbovita (RO)	45.8	Zlínský (CZ)	46.7
3.	Bacău (RO)	44.4	Komárom-Esztergom (HU)	45.4
4.	Suceava (RO)	43.1	Moravskoslezský (CZ)	44.1
5.	Vrancea (RO)	42.9	Hunedoara (RO)	42.0
6.	Neamţ (RO)	38.1	Braşov (RO)	41.6
7.	Mehedinţi (RO)	37.8	Olomoucký (CZ)	40.8
8.	Nowosądecki (PL)	34.3	Rybnicko-Jastrzębski (PL)	40.6
9.	Krakowsko-Tarnowski (PL)	34.0	Győr-Moson-Sopron (HU)	40.3
10.	Maramureş (RO)	33.4	Heves (HU)	40.0

*Romania 2001.

Source: Eurostat, Romanian Census 2001.

2 General determinations of the Carpathians project area: geographical location, spatial structure, borders

2.1 Introduction

For all research and development processes, the designation of the area in question is a vital element. When defining research objectives and tasks we concentrate on a region (treated as a single unit from some aspects) and as a final result we wish to influence or set on a new track the processes taking place in the given region.

The area of the Carpathians Project (project region) is "only" a tendering space in the strictest sense of the word. The objectives, research tasks etc. defined in the tender refer to or are based upon the designated geographical region.

On the other hand, the designation of the region is not accidental, it is concrete task-based, considering that we primarily wish to explore the processes taking place in the mountainous areas of the Carpathians Range. Accordingly, the basic starting point had to be the orographic and physical geographical unit of the Carpathians during the designation.

The actual project region is much bigger than the Carpathian Mountains; it also includes sub-Carpathian areas and even some plains at the foothills. The designation of the region also took environmental, historical, economic etc. aspects into consideration.

The project area actually demonstrates the structures and issues of almost the whole of the European continent, except the seaside regions. The project region can be taken as a junction of the continental issues.

2.2 The Carpathians

The starting points that seem to be evident are only partially evident: the definite core of the Carpathians Project Region is the Carpathian Mountain Range. The conceptual definition and spatial designation of the Carpathians by the professionals of the countries concerned and not concerned was very much different throughout history, and there is still no single designation that meets a public consensus in all respects.

In the European geology literature, the exact structural, evolutional etc. separation of the Alps and the Carpathians is almost an "evergreen" issue, but the issue of the designation of the precise separating line between the Carpathians and the Balkans Mountains is almost just as problematic.

Specific national schools evolved in the physical geographical designation of the Carpathians. In almost all national geographies concerned, the issue of exact designation appeared, but in most cases not even a "national public consensus on the scientific designation" was reached. There were no basically opposite views; it is just minor amendments that have continuously been on the agenda. (This is the reason why we can see slightly different spatial designations and sizes of the designated area in the different geological and geographical maps and encyclopaedia).

According to the Hungarian geographical and geological concepts before 1918, the Carpathians ranged "from the Danube to the Danube", from Pozsony – the Hungarian name of Bratislava – to Báziás [Baziaş]. The distance between the two end points is just over 500 kilometres as the crow flies, however, the arch of the mountain range is somewhat longer than 1,500 kilometres.

These days we can come across designations ranging from 190,000 km^2 to 250,000 km^2, even if we look at the territory of the mountain range in the narrower sense. The question is whether we only consider the orographically contiguous areas as parts of the mountain range or integrate the basins in between as parts, as well.

If the definition of the "most simple" physical geographical concept or object is burdened with uncertainties, we must take it natural that the structures connected to the Carpathians, defined in accordance to much more complex social, political, development policy etc. interests, are even more complex and changeable.

2.3 The Carpathian Convention

At the definition of territory of competence, intervention and influence of the "Carpathian Convention", national concepts, interests and long-term objectives clearly appeared and influenced the direct activities as well. We consider this as absolutely natural, as no organisations and designations are free from the influence of interests.

For the states participating in the Carpathian Convention, the Carpathians are a joint asset; the countries work out new forms of co-operation across their areas "brought in as assets" and create a new system of mutual responsibilities in the region of the Convention.

2.4 The Carpathians project space

The territory of the Carpathians project space is not a functional unit but a "tendering spatial unit" defined and created in accordance with given criteria and objectives. Starting from this basic statement, we do not have to justify what a perfect unit the project region makes; we continuously have to indicate that the region designated meets the longer term interests and development needs, co-operation capacities etc.

Looking at its position within Europe, the larger part of the project region belongs to Central Europe in the traditional geographical sense, whereas the Ukrainian areas are often referred to as Eastern Europe, Romania and Serbia as parts of the Balkans. This makes the project region (irrespective of whether we actually accept the traditional macro-regional geographical designations of the respective states or not) a real macro-regional encounter and interaction zone within Europe, and it has often been a conflict region as well in course of history.

The major part of the region belongs to the catchment area of the Black Sea; only minor parts are in the catchment area of the Baltic Sea. The dominant hydrological axis of the project region is the River Danube that has determined, together with the Carpathians, a significant part of the physical geographical processes of the region.

The first determination of the project region, integrating (uniting) areas from eight countries (Austria, the Czech Republic, Slovakia, Poland, the Ukraine, Romania, Serbia and Hungary) is the inter-state fragmentation. The inter-state fragmentation requires a serious co-operation willingness of all stakeholders for any successful activity.

The total of the respective areas of the eight countries concerned makes 1,547,939 km^2, the total population in these areas is over 153 million inhabitants. The respective countries have extremely different interests and involvements in the spatial, population, economic, settlement network etc. issues of the project region. The one common feature is the "bringing in" of their respective Carpathians areas as assets into the joint project.

The territory of the project space is 459,141 km^2 according to the territorial data of the national statistical yearbooks, i.e. it is bigger than many large European countries. Its population reaches approximately 55,828 million, which also exceeds the number of population in several large European member states.

The project space is extremely mixed in ethnic, linguistic and religious respects. For each element, factor of this complicated structure it is true that any given community makes the homogeneous majority in some areas, a significant part in some other areas and a minority in yet another area. The large European language families (Germanic, Slavic, Roman, Finno-Ugric) are all present in the project space. On the whole, the languages of the Slavic language family prevail.

Before 1945 German language was a sort of community mediating language in the larger part of the region, replaced by Russian in the same role until 1990. Nowadays English is becoming most popular mediating language in the region.

The religious fragmentation is also a serious issue; in fact, in religious matters the region is even more mixed than in the matter of languages. Roman Catholic, Orthodox, Greek Catholic, and the different Protestant Churches are all present and active in the region.

Austria basically considers itself an Alpine country, so its participation in the project space is more based on intentions than on determining physical geographical considerations. In this country the areas belonging to the Carpathian project space include the least developed province (Burgenland), the province most advanced economically (Vienna), and the historically most eastward-looking Lower Austria. The presence of the capital city, Vienna in the project space may be an indication of the special attention of the state organs to the cooperation, and the solution of the issues arising.

The participating Austrian provinces (Burgenland 3,965.5 km^2, 277,400 inhabitants; Lower Austria 19,177.8 km^2, 1,563.3 thousand inhabitants and Vienna 414.7 km^2, 1,612.5 thousand inhabitants) have significant administrative competencies, by which they may have a considerable positive impact on the cooperation processes. It is an open question from the aspect of functional relations to what extent Vienna will regain or reshape its macro-regional system of relations.

The Czech Republic is present in the project space with the larger part of the historical Moravia and its Silesian areas. The capital city, Prague is not concerned directly, but the presence of three large cities in the eastern part of country (Brno, Olomuc and Ostrava) can be a great help to the cooperation. In the case of the Czech Republic, the participating territory doe not precisely cover the statistical division (NUTS division) of the country in effect, neither the regional units of spatial development. This is not evidently positive for the formal and real cooperations and for the potential feasibility of projects in the future.

Slovakia is part of the project space with its total territory. Slovakia is actually a predominantly Carpathian country, with a (potential) central and integrating role in the project, as it has borders to the Carpathian areas of five different countries.

For Slovakia, the Carpathians and the processes occurring in the region raise issues of strategic importance. The country has a vested interest in the rational use of the mountain range, the sustainable management of the environment and the development of tourism.

Poland has a smaller part in the project, but its total southern, Carpathian area is in the project space. The economic development level in the three southern voivodships of Poland is rather different, gradually changing from west to east as a result of industrialisation. Kraków has an in-between position and not only in the topographic sense of the word.

Kraków, coming from its historical past, special social, economic and cultural positions, cannot only be a centre for the south Polish areas but may expand its system of connections to the whole northern part of the Carpathian Mountains.

The Ukraine is represented in the project space by a smaller part of the country (both in territory and population), but with its total Carpathian region. The Ukrainian rayons (districts) cover the narrower area of the Carpathian Mountains in a "two-slope" way: the Transcarpathian area towards the inner areas of the Carpathian Basin, and Lvív, Ivanovo-Frankivsk and Cernivci towards the outer slopes of the mountain range.

The four rayons in the project space cover the western part of the Ukraine, creating links towards four countries. They are neither among the most nor among the least developed regions of the country. Their common feature is the close historical relations that they have to several regions of the countries involved in the Carpathian project space. (Which does not mean definitely positive relations in all cases, however.)

The rayons have a considerable administrative autonomy, although the Ukraine can be taken as a significantly centralised country because of the continuous inner political crises. The rayons have the capacity and the possibility for cross-border cooperations.

Romania has most of its territory and population (including the capital city) in the project space. The Carpathians are of vital importance for Romania not only for international cooperations but also have a great influence on the development of the internal processes. The participating Romanian counties embrace the Romanian part of the Carpathians in a double ring, in a "two-slope" way.

Serbia has a minor part of its territory and population in the project space, but the capital city and the West Banat region, as well as the city of Nis and its region have been a link in many respects towards the neighbouring countries.

Hungary is basically a country in the bottom of the Carpathian Basin, its regions in the Carpathian project space are only partially mountainous (Carpathian) areas, most of them have a plain character. The designation of the area is based on the boundaries of counties, so several of the present statistical and development regions have been split which will not assist cooperation in the future.

Hungary is situated at the lower reaches of the rivers of the Carpathian Basin, accordingly has a vested interest in what land use processes take place along the upper reaches of the rivers. For sustainable environmental management, the prudent management of forests is of special importance.

The project region is not only divided by state borders; also from an administrative point of view it is a very much varied (heterogeneous) region. Besides the necessary involvement of the respective countries, the competencies of the designated administrative units are rather different, even across the EU members we see

considerable discrepancies. The individual administrative units have interests in several levels, so their interests in the cooperation are necessarily different.

In the whole of the Carpathian project space, not only the EU, the respective states and the participating administrative units but also the local social actors have a significant role. It is especially the reconsideration of the formerly applied methods management of the hilly and mountainous areas that can contribute to the sustainable use of the whole of the mountain range.

3 Historical geographical features of the project space

The project space, coming from its spatial size, geographical determinations and topographic location, has been integrated into the historically changing east-west and north-south demographic processes and power shifts of the continent. The radical changes of the state-making processes in the region have almost been continuous in history, states and empires were born and ceased to exist in course of history. In all historical periods several possible divisions of the region appeared: a single state covering the whole of the Carpathian Basin, the division of the regions in the basin among several powers or the integration of the whole Carpathian Basin into a much larger empire.

From the aspect of the Carpathian Mountains in the narrower sense this issue raised the dilemma whether the Carpathians would be the long-term boundary, the border of a single state covering the Carpathian Basin, or of a basin divided among several states, or a "simple transport obstacle" within a large empire.

The Carpathians influenced not only the direction of migration of different groups and peoples but also the long-term processes of both the mountainous areas and the systems of basins largely determined by the Carpathians. We also have to see, however, that the Carpathians have almost never been an unmanageable obstacle in history; it has been permeable at almost all the time for all peoples and later for all armies.

3.1 Spatial constituents and consequences of the long-term historical processes

Until the great rearrangement induced by the modernisation of the 19th century, several state forming and demographic historical processes had occurred in the region, of which we only indicate a few.

- In the region in the broader sense, the central and southern processes of the European continent had almost always had an influence since the early times.
- The large part of the Carpathian Basin had first been integrated within the frameworks of the Roman Empire as part of the European economic, social and population development processes. In the last period of the Roman Empire, the bigger part of the Carpathian region was thus the periphery of this great southern integration. The external border of the empire was mostly the River Danube, in smaller eastern border sections were made by the range of the Carpathians. In the territory of the province of Dacia, the Romans started the utilisation of the large part of the basin by exploiting the natural assets, minerals of the area. The development of the outer areas had different devel-

opment direction and character than the basins. In the north-western part, different Germanic tribes appeared, Slavic tribes in the northern parts, while different eastern peoples gathered in the eastern foreground of the mountain range.

- During the great Eurasian migrations, the Carpathians were not an obstacle, almost all mobile ethnic groups were able to pass the mountains. Fights were made for the rule of the basins and not for the mountain range.
- The real power issue after the defeat of the Roman Empire was whether the basin should be subordinate to one single power or several smaller powers, or maybe would become part of a new macro-regional organisation in the long run.
- The Hun Empire gradually fell into pieces after 453, so at the collapse of the West Roman Empire (in 476) disintegration became typical in the region.
- The power unity of the Carpathians in the broader sense was re-created by the Avar people. Around 600, the Avar Empire organised the major part of the Carpathians and the basins into one single political unit. After the breakdown of the power of the Avars (by Chartemagne), the region gradually turned into a conflict zone among the Eastern Frankish Empire, the Byzantine Empire, the Great Moravian Empire and the Hungarian tribes arriving from the east.
- From the late 9th century, the Hungarians determined to a large extent the most essential processes within the Carpathian Basin and on the inner edge of the mountain range. (On the outer edges the Germans, Moravians, Poles, in the eastern territory for a short period the Besenyő, later the Kuns tribes, permanently the Romanians, in the south the Serbs became dominant people of the territory.) In the Hungarian spatial view and land use, the mountain range was not very much appreciated, actually the Hungarians consciously created a macro-regional froentier zone in the large part of the mountain. The watershed on the ridges of the Carpathians gradually became the state borders of the Hungarian motherland, and these functions were preserved for almost a thousand years, within changing political, power, spatial etc. relations.
- The Hungarian ethnic area was not radically expanded to the higher elevations, so the indigenous population of the mountains (Slavic), the immigrating Romanians and the continuously and consciously settled down Germans acquired partly homogeneous ethnic areas.
- In the present western areas of the project space (Ostmark, Steiermark) a Hungarian–German rivalry, in the eastern areas (Halics, Ladoméria) a Hungarian–Slavic competition took place for a longer period. In the Hungarian–Polish border region, a peaceful co-existence was more typical.

- In the eastern and southern part of the region there was a partition and a gradual segregation between the western and the eastern Christian Church. The church segregation proved to be stronger than any other social characteristics for centuries.
- In 1241–1242 a significant part of the region was conquered by Mongol troops, but only the eastern areas remained under Mongol (a super power of Asia at that time) influence for a longer time.
- The Hungarians occasionally expanded their rule to a larger part of the Carpathians, or joint kingdoms (of the Czech, the Hungarians and the Poles) created a formal power unity over the whole of the region.
- Due to the specific order of the feudal spatial dependencies, already in the early times the formation of smaller, partly autonomous or "awarded" areas started (Silesia, Little Poland, Halics, Lodoméria, Wallachia, Moldva). These region in turn could become specific units with own identity.
- With the gradual expansion of the Turks, first the southern parts of the macro-region, after 1526 gradually other parts of the bottom of the Carpathian Basin were under Turkish rule. The Carpathian region became a battlefield between Christians and Muslims for a long time.
- The appearance and expansion of the reformation led to a sharp division of the former Catholic Church within the region. In the traditional areas of the Orthodox Church the reformation had hardly any success.
- In 1648, at the beginning of the formation of the new administrative order of Europe, the largest part of the Carpathian region was under Turkish rule, smaller parts belonged to the Habsburgs and the eastern and north-eastern parts to Poland. (The Principality of Transylvania had a special position in political, power and spatial structures.) After 1686 the Turkish Empire was gradually pushed out of the core areas of the Carpathian Basin, but kept its rule over the southern edges and the eastern parts of the Carpathian area.
- Ethnic territories have not been always sharply separated, many different combinations of the co-existence of ethnic groups could have been observed: Germans, Moravians, Hungarians, Slovaks in the Little Carpathians; Germans, Slovaks and Poles in the southern part of Silesia; Poles, Slovaks, Hungarians and Germans in the northern frontier zone; Poles, Ukrainians/Rusins, Hungarians and Romanians in north-east etc. The development of the situation of the Jewish population of Galicia was an issue of an independent ethnic area all through the modernisation period.
- By multiple division of Poland (in 1772, 1793 and 1795) a significant part of the Carpathian area was annexed to the Habsburg Empire, while the eastern parts remained under Turkish rule before the independence movements of the new small states.

- Napoleon temporarily rearranged the territorial administrative division of the area several times, after his defeat the Habsburgs, the Prussians and the Russians became dominant power factors.
- Between 1815 and 1848 a relative stability of the ruling powers characterised the area (although Kraków with its narrower neighbourhood was annexed to the Habsburg Empire in 1846). The major part of the region belonged to the Habsburg Empire, its eastern and southern parts to the Ottoman Empire. Smaller areas were integrated into the German and the Russian Empire.

As a result of the long-term historical development, significant development disparities evolved among the different areas of the Carpathian's Region by the end of the feudal times. The social, economic, cultural, civilisational level basically decreased or gained a special content from west to east.

3.2 Spatial processes of the project region in the time of modernisation

Revolutions and wars of independence in the middle of the 19th century, and the social, economic and technical (railway) development gradually also created a new situation in the Carpathian region. The Austrian–Russian co-operation – later rivalry –, and the Russian–Turk opposition determined the major directions of the transformation.

After the next great European rearrangement (Berlin Congress in 1878), the major part of the region became territory of the Austro–Hungarian Monarchy. In the south, Serbia integrated some areas, in the East, the newly independent Romania did so. From the present project space, only negligible areas belonged at this time to the Russian and the German Empire. This period is very interesting because not only political borders and relations changed in the area but the modernisation was also accelerated. The major part of railway constructions were implemented within the new state borders, and the political relations had a great influence on the direction of the railway, the frequency and quality of the lines (in the Russian areas even the rail gauge). Railway construction started in the western part of the Carpathian Basin already before 1840, followed by construction around the capital city of Hungary in 1847 (Pest–Vác, Pest–Szolnok).

The spatial policy differences between the two parts of the Austro-Hungarian Monarchy (Austrian Empire and Kingdom of Hungary) appeared mostly in the construction of the railway network. The debate over the Vienna or Budapest centred railway network was solved by making Vienna the centre of the Austrian areas and Budapest the railway centre of Hungary, covering the largest part of the Carpathian Basin. The railway network had state political (military strategic, de-

fence), economic policy (single market), and national policy (integration of the ethnic minorities to the majority) considerations in the region.

For the Carpathian region it meant that the Austrians built their own large-capacity railway along the external ridges of the Carpathians, defining the movements from Bukovina to Vienna, while the Hungarians constructed railways crossing the borders or the Carpathians in the most necessary cases and places, only.

From the middle of the 19th century until World War I a dominant feature of the larger part of the project space was the belonging to an actually single economic space, the region was not cut by tariff borders. Capital, architecture styles, labour etc. could freely move within the Austro–Hungarian Monarchy.

A very important factor of this period was the conscious development and strengthening of the imperial centres and the national capitals. The rivalry of Vienna and Budapest created two modern large cities similar to each other in many respects. The capital cities of the smaller countries (Bucharest, Beograd) developed extremely rapidly into modern large cities. In the case of Kraków, Bratislava, Lemberg and Chernovic, provincial centres became the focuse of development.

World War I basically rearranged the state territories and state borders in the region. For the Carpathians, one of the most important changes was the birth of Czechoslovakia, a country that created new administrative frameworks for the northern part of the Carpathians. The other turn of large importance was the increase of the territory of Romania, in the middle of which ran the central and the southern main ranges of the Carpathians. After the re-foundation of Poland, the northernmost areas became parts of the Polish state again. Austria lost its influence in the macro-region in the broader sense; it became a definitely Alpine country with negligible Carpathian areas left. Hungary kept its areas in the bottom of the Carpathian Basin and lost its areas in the Carpathians. Within the new Yugoslavia, Beograd became much more interested in the Dinarides than in the Carpathians.

The period between the two world wars was not favourable for inter-state co-operations among the winners and losers of World War I. The Little Entente (Czechoslovakia, Romania and Yugoslavia) protected its territorial gains against the Hungarian territorial revision efforts. In the Carpathian region, even the Czechoslovakian and the Romanian railways were connected, although the single development of the Carpathian region was never on the agenda. The formerly single economic space was now split by tariff borders, national economic policies etc. into special and allegedly sovereign parts.

Within the new state borders, the transformation of the networks (railway, road, settlements) started in accordance with the new state borders. The role of Budapest and Vienna was naturally depreciated in the new processes. The role of

Prague became more important in the Czechoslovakian part of the Carpathians, the significance of Bucharest in the Romanian parts of the mountain range. New roads and railways were built, according to the needs of the new capital cities.

During World War II a considerable (and short-term) rearrangement of the state territories and state borders took place again. The new spatial configurations, however, were short-lived. After World War II practically the whole area was under Soviet military rule. Essential spatial rearrangements took place again, Poland was "pushed" westwards, and after the war the Soviet Union acquired the territory of Transcarpathia, thus became a stakeholder in the Carpathian Basin.

The iron curtain was pulled down after 1945 in the western areas of the Carpathian region, as well, especially after the Soviet Union withdrew from Austria in 1955. The relationships between the neighbouring capitalist Austrian and the socialist Hungarian, Slovak and Czech territories were interrupted. (Later the Austrian–Hungarian relations developed more rapidly than the Austrian–Czechoslovakian ones.)

In the relationship among the respective socialist states – also in the Carpathian region – isolation became dominant, many of the formerly functioning rail and road connections among the states ceased to exist. The connections between the neighbouring populations were especially weak along the borders of the Soviet Union. In many respect it is justified to talk about a "socialist iron curtain".

After 1989 and 1991 new transformations, partly rearrangements of states occurred in the region. The disintegration of the Soviet Union left Ukraine as an actor interested in the region. After the secession of Czechoslovakia, Slovakia became a fully Carpathian country. In the decreased territory of Serbia, the significance of the areas belonging to the Carpathian project space was appreciated.

In 1993 the Carpathians Euroregion was established, a formation that integrated the eastern areas of the project region into an organisational framework. The co-operation integrating the border regions of several countries had a difficult start and its results have been very moderate so far. Euroregions were established in the whole of the project space, now there is no area in the region that is not a member in at least one Euroregion.

The systemic changes did not solve overnight the effects of the many decades of isolation, especially in the southern areas where the Yugoslav civil war resulted in new restrictions and new border locks.

In 1995 Austria became an EU member, making the European Union a significant stakeholder in the region. Different European Union programmes between Austria and the neighbouring Carpathian areas were launched. The enlargement of the European Union in 2004 made the larger part of the project space EU territories. After the enlargement of 2007 it is only the Ukrainian and the Serbian parts of the project space that are outside the borders of the Union. In the major part of the project space it is the EU rules that prevail now.

4 Environmental management, risk prevention, natural and cultural heritage in the Carpathian area

4.1 Water management, water pollution and flood control

The Carpathian area has a rather varied surface with high and medium-high mountains, forelands and basins in between. This fact determines water management in the region as regards the ability of the area to supply the demand for water. The variety of configurations in this mountainous terrain makes the landscape rather heterogeneous. Thus, some parts of the region have ample water supply, while others have to cope with shortage of water. Water bases with abundant supply concentrated in one place are located either in stretches along the river valleys or in patches over the karstic areas where significant quantities of good quality karst water can be found. The watershed between the Black Sea and the Baltic Sea draws along the North-western Carpathians, and this fact highly influences the spatial structure of water management. The rivers Oder and Vistula flow into the Baltic Sea, the Danube and its tributaries take the water of most rivers in the Carpathian into the Black Sea. The river Dniester also flows into the Black Sea catching water from the rivers of the North-eastern Carpathians along Ukraine. Such huge water supply is an extremely valuable natural resource. From the 1960s and 1970s onwards it was, however, exposed to great hazards due to the impact of various forms of pollution (*Table 9*).

While the smaller streams, rivers and creeks, of the higher mountains were very clean and had a high ecological value, the heavy industry with intense water demand (such as chemical industry) settled along the bigger rivers and caused very serious damages due to water pollution. The immense ecological disaster of the river Tisza was part of this process. The burdening of rivers with organic matter along the industrialized regions in the Carpathian area reached its peak in the first half of the 1980s. In general the concentration of organic pollution in the rivers of this area exceeded that of the rivers in Western Europe. River Oder and its tributaries are heavily polluted, in addition to those flowing from the cachment area of river Danube, Vah, Nitra, Hron, Sajó, Hornad, Somes, Mureş, Olt, Jiu. Significant improvement has taken place since recent years in Poland, the Czech Republic, Slovakia and Hungary. Lakes especially in the higher areas of the Carpathian Mountains are of great natural value. Approximately 200 pristine glacier-carved lakes can be found in the North-western Carpathian Mountains.

Subsurface waters are becoming increasingly significant in the water management of the region. In the Hungarian territory of the Carpathian Mountains drinking water is gained mainly via river bank filtration, and stored in 5 large water bases within the region. The first of these is found on the river Danube, in

the western periphery of the region (with a theoretical capacity of 100,000 m^3 per day). The second is found in the Ipoly valley (with a capacity of 30,000 m^3/day), functioning as an important reserve for Salgótarján and the settlements in the Zagyva valley. The third water base is found near Sajószentpéter, the ballast-filled the Sajó valley, but its water is polluted by the nearby industries and therefore its use for community purposes is rather limited. The fourth water base is located not far from here, near the mouth of the river Bodva, with a capacity of 10,000 m^3 per day. The fifth water base is in the ballast-filled Hornad valley. Only half of this last base lies within the region's boundaries, the other half belonging to the Great Plain. About 70% of its 50,000 m^3 par day capacity is used primarily to supply of town Miskolc. This example shows that the large quantity of groundwater supplies near river basins in the Carpathians gain an increasingly important role mainly due to the fluctuation of stream regime.

Table 9

Overview of the subdivision of the Carpathians into rivers basins and their characteristics (2006)

River	Total drainage area (km^2)	Drainage area within the Carpathians (Study area) (km^2)	Proportion of the total Study area (%)	Affected Carpathian countries	Estuary
Danube	817,000	180,095	85.7	All Carpathian countries	Black Sea
Dniester	76,860	7,336	3.5	Ukraine	Black Sea
Vistula	194,000	21,054	10.0	Poland, Slovak Republic, Ukraine	Baltic Sea
Oder	125,000	1,772	0.8	Czech Republic, Poland	Baltic Sea

Source: Implementing an international mountain convention. An approach for the delimitation of the Carpathian Convention area.

Another important type of ground waters is the karst water that is spatially concentrated in the limestone covered areas of the Carpathians, where larger quantities to be found. Nowadays, this valuable source of freshwater supply is only exploited to a limited extent.

Problems regarding the water supply of the Carpathians are mainly related to the significant variations in the available water quantity (depending on the amount of precipitation in dry or rainy years). Another kind of problem is caused by the strong dependence of the region's water supply on the water outside the borders

of the countries embracing the Carpathian Mountains. For example, not more than about 26–28% of the water of the Sajó, Bodva and Hornád rivers can be used in Hungary. The example shows how the use of water is limited by the fact that in the neighbouring countries industrial water has flown back into the rivers in a highly polluted state for several decades now, therefore no serious improvement can be expected in the quality of water until the turn of the millennium.

The limitations on the production of good quality water were recognized as early as the 1980s, and these enforced the introduction of more economic technologies as far as water use was concerned both in the industry and agriculture. At the same time, the improvement of the quality of life went together with the construction of water mains in the settlements. By 1988 this significantly increased the proportion of communal water consumption relative to industrial and agricultural consumption.

Thus, the European Commission's new Water Framework Directive is of crucial importance from the perspective of the future developments in the water management of the Carpathian Mountains. The Directive aims at bringing together land-use policies and water management programmes in this innovative form of internationally implemented integrated river basin management. As there Charpathians are a vital source of freshwater in Europe, this process is of great importance for the Carpathian Mountains. With emphasis added on achieving good ecological status of water, the implementation of the Directive requires appropriate water management.

4.1.1 Water pollution

The quality of surface waters can be rated as medium. Regarding the permitted levels of water use our observation is that some streams or sections are overloaded. The pollution from rapidly developing settlements near river basins means an increasing hasard. As far as pollution sensitivity is concerned, certain alluvial cones providing drinking water are considered particularly sensitive. However, the entire network of the river valleys in the Carpathians is extremely sensitive to the hazards of all kinds of pollution. Regarding emission limits to surface waters, the catchment areas of the rivers as well as the built reservoirs together with catchment areas have been qualified as protected receivers. The diffuse impact of pollution sources together with the contaminants washed into streams from agricultural areas – the more and more intensively used chemicals – bring about hazards in the widening river valleys in mountains of medium height and especially in the hilly areas. Rivers arriving at the edge of high mountains slow down, and they start fill up their basin, thus, the risk of dangerous floods increases. At the same time river basins have been greatly silted up due to the

slowness of the flow. The river takes the characteristics of stagnant water, which fact leads to the process of eutrophication. The case of the river Sajó, flowing into Hungary from Slovakia exemplifies this process, because the burdening of the river continued in Hungary.

The river Sajó has been receiving industrial wastewater and communal sewage from the surrounding urban areas. Due to the diffuse impacts of pollutants washed in from agricultural lands the river is also contaminated with agricultural chemicals. By the late 1960s the river had been polluted to such an extent that it became most polluted river in Europe, with hardly any wildlife. Thanks to the domestic and foreign efforts made to improve water quality (construction of water treatment plants, modernization of industrial technologies, etc.) a slow recovery could have been observed. Since 1990 a sudden improvement in water quality has occurred when the paper mill of Gömörhorka was closed down, and this condition continues to the present day.

In the Hungarian reach of the Sajó, the impact of industrial wastewater and communal sewage coming from Kazincbarcika and Miskolc is particularly detrimental for the indices of oxygen and nutrients content of the waters. Since the construction of the municipal water treatment plant in Miskolc the load on the river has been reduced thanks to the new biological unit. The process of self-purification and the diluting effect of the river Hornád have both contributed to the improvement of water quality. High nutrients content, characterizing all along the river, has led to instances of eutrophication in recent summers. This process exemplifies the quality changes in the streams of the Carpathians in its hilly areas and areas with mountains of medium height.

Elimination of water pollution is particularly difficult due to the fact that the process of canalization hardly meets the increase in the environmental burdening from settlements. High costs represent the biggest obstacle in the slow progress of canalization.

4.1.2 Flood and flood control

Floods have increasingly endangered the environment in the last few decades all, yet especially the Carpathian region is exposed to such hazards. In the Carpathians, stream regime influences flood risks as well as other factors of water management. However, there is a drastic growth in the risks of environmental catastrophes rooting in the global climate change. Thus, it is very important to have enough information regarding the extremely changeable stream regime of rivers in the Carpathians. It can be classified along three major types. Rivers in the high mountains have the lowest level of water, when snow almost entirely holds back precipitation. High water occurs at the beginning of summer, when snow and ice

melt in the mountains and high water risk is further increased by the more and more frequent rainstorms bringing extra amount of precipitation and resulting in disastrous floods. The lowest water output of rivers in mountains of medium height also occurs in winter. Snow, however, melts earlier in these areas, thus the level of water in these rivers advances rapidly and causes the danger of inundation.

The water output of rivers in hilly areas is the biggest in spring, however, their level often rises even in winter when the snow melts in the lower areas and there is little evaporation. At that time the danger of inundation increases. In summer and fall there is little precipitation, and evaporation is high, therefore the water output is the lowest at that time.

Flood control in the Carpathians means mainly the construction of dikes that reach across the borders. The capacity of storing flood waters is relatively small. Most of the damages caused by floods are due to changes in the use of land, unregulated development of urban areas, the economic utilization of flood areas and the weaknesses of the institutional system. Floods in the Carpathians call the attention to immunent risks of environmental disasters. The modified Vásárhelyi Plan developed in Hungary could be an example of up-to-date flood control.

4.2 The hazards of deforestation

The forests of the Carpathians are part of Europe's natural heritage; their ecosystems show a unique genetic diversity and variety of species. Such wealth demands increased attention and protection. More than 50% (106,183 km^2) of the studied area is forested: 49,44% is broad-leaved forest; 27,43% is coniferous forest; and 23,13% mixed. The largest forested territory belongs to Ukraine, where 91% of land is forest. 40,9% of Slovakia is forested; its biggest part is broad-leaved forests (58,2%), and the ratio of coniferous forests is 41,8%. In Romania 69% of forested lands is brad-leaved forests and 31% coniferous. Thanks to the Carpathians, Romania has an extremely large biodiversity in Europe, with 3,100 indigenous plant species of which 60 tree species can be found here.

The ratio of forest areas in Hungary (18.2%) can be rated as medium level in comparison with the EU member states. (Comparison made in 1990: Magyar Tudománytár [Hungarian Scientific Repository] 2003). The proportion of forest areas is particularly high in the Hungarian part of the Carpathian region, more than 52% over the whole territory. In the core areas of the mountains this figure is much higher, between 88–94% and as low as 25–38% in the basins and river valleys. These variations in the ratio are also true, of course, for the constituting counties (e.g. in Borsod-Abaúj-Zemplén and Heves counties the level of afforestation is nearly 60%, in Pest and Nógrád counties over 40%).

Approximately 65% of the forests are used for economic purposes, where typical activities include – among others – logging and hunting. Another 34% is under protection; the long-term protection of these forests is a national or regional interest.

After the change of regime there were significant changes in the ownership of the forests in the Carpathians. As a result of market interventions, a large proportion of the region's forests became private property, while protected areas have remained state property. For example in Slovakia from 2,002,130 hectares of forested area only 830,555 hectares remained state property. This new ownership structure makes it more difficult to accomplish the goals of a uniform forest management in the Carpathians. Felling pursued in the interest of quick profits may cause serious damage in some areas (e.g. felling precious tree species without proper replacement, increased danger of erosion due to clear-felling, elimination of ecological corridors, etc.), therefore forest owners should assume more responsibility for the long-term maintenance of this natural asset. In the past decade, the so-called "wind-felling" has occurred more and more frequently especially in the coniferous forests of the high and medium high mountains of the Carpathians. Wind-felling is deforestation caused by extreme windstorms, as a result of which felling proceeds almost continuously. Such destructions occur almost everywhere from the North-western Carpathians to the Southern Carpathians (e.g. High Tatras).

Forest management includes a lot of distinctive activities in the Carpathian region as well. Besides providing wood, forests have functions that are becoming more important recently in fields like energetics, environmental protection, welfare and hunting. Changes in the roles of forest have been accelerated within the region since the second half of the 20th century.

On the one hand, the number and size of national parks, protected landscapes and conservation areas have increased and, on the other hand, forestries have suffered a gradual narrowing of their scope of activities, while always stricter environmental and protective regulations have been introduced setting new limitations to their work. In the early 1970s the so-called resort forests'used for various recreational purposes (resting, walking, excursions) which are important tourist attractions in the region began to increase both in number and area.

4.2.1 Soil degradation, erosion

The most serious soil degradation processes in the Carpathian region are attributed to the increasing acidity of the soil Significant acidification has been observed in the vicinity of industrial areas caused by the air pollutants emitted. Such is the impact of the industrial agglomeration near Ostrava, Katowice, Cracow, the

valley of the river Vah, the industrial area near Košice, Miskolc, and the industrial centres in Romania. Erosion caused by the wind hit primarily the plough lands. Erosion caused by water threatens most of the area (at least 70%) to a great or medium extent. Deforestation has badly damaged the steeper slopes for some time now, while flood areas are threatened by the accumulation of heavy metals as well. Erosion caused by water is very strong in the Carpathians; a large area is eroded in the Czech Republic and Slovakia, in the Eastern and Southern Carpathians as well as in the territory of the Transylvanian Basin in Romania, in South Poland and in the Hungarian region of the Carpathians. Thus, there is an increased risk related to erosion caused by water even compared to the other member states of the European Union. From an environmental perspective, the long-term effect of erosion caused by water is the most dangerous. The decrease in the humus content, the diminishing of the surface soil and the structural deterioration gradually decreases potential (natural) fertility, adsorptive and buffer capacity as well, therefore, the soil becomes more sensitive to acidic materials, and gradually loses its ability to absorb nutrients. This is a great problem in the entire region of the Carpathians. The fact that mountainous soils that are originally of worse quality are especially strongly sensitive to the process, further increases the risk. Thus, the deterioration of the soil indirectly accelerates forest decline (decreasing absorption of nutrients, spread of various forms of mycosis etc.). The risk of erosion will supposedly grow progressively.

4.3 The potential impacts of climate change

The entire region of the Carpathians, but especially its southern, south-eastern peripheries, is particularly threatened by a potential climatic change. This is the area where the aridity index line (A=1) runs, separating the arid and humid areas in the climate of plough lands. At present the entire region still belongs to the humid climate, but a 0.5–1 °C increase in temperature would push the line of aridity index significantly towards the inner parts of the hilly area. This would lead to marked changes in the climatic optimum of both potential vegetation and vegetation culture (field crops and certain tree species). Such a modification in the climatic ranges would damage or even destroy the conditions in which field crops and certain tree species can grow. The most valuable forest vegetation can be found in the area of the Carpathians. However, the aforementioned aridity index line makes our climate increasingly changeable. The vulnerability of the forest ecosystems is further enlarged by the vagueness of the long term climate forecast. In the case of indigenous leafy hardwood trees there are 80–120-year-long periods of forest management planning. Harmful effects do not spare pine-forests in the

high mountains of the Carpathians. The results of research works justify that closed forest-lands have to be preserved as long as possible. Damages may be reduced by means of accumulating biomass, promoting the formation of humus and introducing natural forest management.

4.4 Air pollution

In the 1950s and 1960s, the extent of air pollution reached unacceptably high values especially in Eastern-Central European countries, precisely in the extensively industrialized regions of the Carpathian Mountains. The source of pollution was the heavy industrial basis built from Katowice to Kosice through Miskolc along the valley of the Jiu river. The most polluted industrial large regions, the Czech and Polish Silesia, the industrial region in Košice and Miskolc where the dust and the emission of SO_2, NO_X and CO_2 exceeded many times the emission norms. A significant part of the air space of the Carpathians was further burdened because at that time Romanian industry entirely lacked all forms of air filter equipments. The crisis of these heavy industries in the 1980s and the structural transformation of the economy triggered by the change of regime led to a considerable decrease in the emission of air pollutants.

This territory including several connecting regions with polluted air divided up from the 1990s onwards; and traffic became an increasing source of air contamination.

Air pollution affects mainly the densely populated areas and larger settlements of the Carpathian region. There is a nearly complete overlap between the densely populated areas and the most polluted ones. The total area is relatively small, but the number of inhabitants is high. Although air pollution damages agricultural areas, natural values and material assets as well, it remains primarily a health problem.

In the last 10 years the formerly dominant industrial (mainly heavy industrial) and power plant emissions have shown a radically decreasing trend. Their impact, however, is still observable in some towns, where large industrial plants or power plants are still in operation. The polluting effect of energy consumption by households and public institutions is easily proved with the help of data collected in the heating season, and this effect is quite significant in the larger towns. In the towns and the vicinity of busy motorways or main roads, traffic is the main cause of air pollution.

After 2000 the emission of air pollutants decreased significantly. Nevertheless, the air space around the earlier mentioned industrial regions (Košice, Ostrava, Miskolc, Cluj and Bihor counties in North Transylvania) is still polluted.

Immission levels have significantly decreased in mountainous areas (2001 Slovakia: concentration of SO_2 on the Chopok 0,90 μg (m^3). The maximum concentration of NO_x has become 30% lower than the allowed limit. According to the forecasted data regarding 2010, subsiding extra sulphur-dioxide will be less than 50 tons/km^2 in the Carpathian region in the Czech Republic, Poland and Ukraine. Before 1990 this data reached 500 tons/km^2 in the most polluted Polish, Czech, Slovakian and Hungarian regions. Air quality improvement plays a crucial role in decreasing health damages due to environment pollution, diminishing potential climate changes, and the risks of forest decline.

By 2004 the number of people living in 'polluted' areas decreased considerably as compared to 1997 but there was a sharp increase in the number of those living in 'moderately polluted' areas. On the whole, pollution now affects fewer people and its concentration is also smaller.

4.5 The environmental impacts of Carpathian industries, transport and agriculture

The Carpathian region used to be the basis of heavy industry in Eastern-Central European countries. It was characterized by low technological level and caused serious environmental damages. It was typical in the 1960s–70s that the processing of 2.4 tons of raw material by the industry produced 1 ton of primary industrial waste and refuse. Consequently, the vast majority of the industrial waste was accumulated in the largest heavy industrial areas in the Carpathian region. Because of the abundance of natural resources this environmental degradation caused by the industry continued across the border, in the Slovak and Polish parts of the Carpathian region as well, leading to an extended destruction of forests all over the Carpathian region.

Traffic meant a similarly heavy load on the environment. Road traffic developed rapidly but the cars had low capacity and strongly polluted the air. This, together with the presence of heavy industry in the Carpathian region contributed to the worsening of the situation. The air and the waters were heavily polluted, and waste accumulated on the dumpsites both legal and illegal.

In the Carpathian region conditions for agricultural production are less favourable than on the Great Plain primarily because of the hilly surface, and farmers have no alternative but to adapt themselves to the special conditions of the landscape. At the same time, the varied soil, surface and regional climatic conditions are most suitable for a great variety of agricultural activities, mainly in the river valleys and at the foot of the hills.

Efforts have been made to improve the quality of the soil with chemical fertilizers. Thus, by 1983 (the peak in artificial fertilization in the agrarian regions of Eastern-Central European countries) the use of fertilizers in some weaker agricultural parts of the Carpathian region increased to 40 times the amount used in the early 1950s. This increased the acidity of the soil and the nitrate content of ground water all over the region.

4.6 Nature conservation in the Carpathian area

The Carpathian region is very rich in natural assets. The region's most specific value is its liminal function as a kind of transitional area and a link between the hilly areas and the lowland, ensuring the migration of species living on the plain. The area is crossed by important ecological corridors, between the Carpathian Basin and the Carpathian Mountains. As the national borders are not easily accessible, it contributed for a long time to the conservation of the natural ecological conditions and the maintenance of biodiversity, the great variety of the landscape, nature and culture in the area. Thus, the Carpathian Mountains together with the Carpathian Basin are one of the regions in Europe with the largest biodiversity that abound in species, which hardly occur in the territories north or west of the Carpathians. The proportion of forested land is very favourable in the region. Even in the least forested Hungary (18,2% of its entire territory is forests) 52% of the areas that belong to the Carpathian region is forested, whereas in the core areas of mountains this proportion is 88–94%. Forests help maintain biodiversity especially in those border areas where multidirectional impacts add up, for example in the foreground of the Northern Carpathians the Gemer-Torna Karst with Carpathian, Pannonic and sub-Mediterranean impacts. The large number of endemic species in the flora and fauna of the Carpathian region is one of its greatest assets. This fact strengthens the position and importance of nature conservation. The number of national parks, the size of areas under protection and protected natural values increases rapidly.

Development of the Natura 2000 network is important in the process of nature conservation in the Carpathian region. This network links valuable natural sites and habitats into a more or less related chain. The areas of the Natura 2000 spread out on 2,6 million hectares in 2004 (*Tables* 10–12).

Table 10

Large-scale protected area types in the Carpathians (Alpine Network for Protected Areas, 2004)

Country	National Parks	Nature Parks/ National Nature Parks	Protected Landscape Areas	Landscape Parks/ Regional Landscape Parks	Area (ha)	Total
Czech Republic	–	–	3	–	195,610	3
Hungary	3	–	7	–	161,113	10
Poland	6	–	–	12	525,321	18
Romania	10	5	–	–	597,308	15
Slovakia	9	–	11	–	787,942	20
Serbia	1	–	–	–	63,608	1
Ukraine	–	7	–	9	304,392	16
Total	29	12	21	21	2,635,294	83

Source: Implementing an international mountain convention. An approach for the delimitation of the Carpathian Convention area. Bolzano 2006.

Table 11

Overview of the number and total area of the Ramsar regions in the Carpathian countries

Country	Total N° of areas in the country	N° of which lie whithin the Carpathian Ecoregion (N°)	Area (ha)	Ha of which lie within the Carpathian Ecoregion (ha)
Czech Republic	11	1	43,432	11,500
Hungary	23	2	117,228	2,151
Poland	9	0	90,455	0
Romania	2	0	664,586	0
Slovakia	13	5	38,943	2,326
Serbia	5	0	40,837	0
Ukraine	33	1	744,651	29

Source: Implementing an international mountain convention. An approach for the delimitation of the Carpathian Convention area. Bolzano 2006.

Table 12

Overview of the IBA in the contract states of the CC (Birdlife International, 2005)

Country	Total number of areas in the country	Thereof in the study area	Area (ha)	Thereof in the study area (ha)
Czech Republic	16	3	627,853	125,380
Hungary	43	7	1,466,244	308,800
Poland	81	4	2,966,277	204,194
Romania	44	13	655,727	126,049
Slovakia	32	22	1,216,737	1,150,898
Serbia	40	n/a	101,500	n/a
Ukraine	141	3	2,486,864	222,107

Source: Implementing an international mountain convention. An approach for the delimitation of the Carpathian Convention area. Bolzano 2006.

4.7 National parks in the Carpathian area

The Carpathian region is one of the richest areas in Europe regarding the amount of natural values. The first national park was established in Romania, in the Retezat Mountains, in 1935. In 2004, there were 29 national parks in the Carpathian region (*Table 10*). In 2005, two more national parks were established in Romania (Bulia-Vãnturarita and the Jiu Valley National Park). Three national parks can be found in the Hungarian region of the Carpathians, however, there are five national parks altogether in the study area of the project. Fertő–Hanság and Körös–Maros National Parks also belong here, thus, altogether there are 33 strictly protected areas. An important characteristic feature of the region is that 12 national parks have been created along the national borders. The foundation of such cross-national parks is enhanced by the rich biodiversity and social circumstances. Before 1989 natural values in these areas were protected by means of political isolation, nevertheless, nowadays it is international cooperation towards nature protection that helps preserve these areas in their original beauty and use.

5 Carpathian settlement structure

Carpathian development region (CDR) with its borders roughly defined covers parts of 8 countries. Moreover it covers not only the mountain range of Carpathians but also foothills of the mountains and areas neighbouring the mountains as well as some areas which apparently have little to do with Carpathians in a geographic sense. Their inclusion into the project area is rather the result of administrative division, social and economic links than of physical features of the area.

Analyzing the settlement structure covering the CDR, authors have concentrated on the substantive area covered by Carpathian Mountains with respect to administrative units (mostly NUTS3 level). The first step was to divide population living in these units into urban and rural. On this level it is necessary to say that in some countries there are not only cities, towns and villages as the main types of settlements, but there are also other urban settlements like e.g. town type villages in Ukraine (treated in the analysis as urban settlements) or Marktgemainde in Austria (treated in the analysis as rural settlements).

The urban settlements have been divided into four ranges:

- above 500,000 inhabitants,
- 100,000 – 499,999 inhabitants,
- 20,000 – 99,999 inhabitants,
- below 20,000 inhabitants.

Moreover the urbanization index and population density have been calculated. The results are included in the final table "General Characteristic of Carpathian Settlements''. Because of the fact that there has been lack of data concerning the number of villages for some regions, settlement density had not been included in the table. Some information about settlement density and spatial distribution are included in the text and in *Table 13*.

This study covers the characteristics of settlement structure in each country within the project area and its final part contains conclusions concerning the whole project area.

5.1 Austria

Generously drafted the Carpathian development region encompasses 3 NUTS2 units of Austria namely Niederösterreich, Burgenland and the capital city of Vienna. Population of such territory amounts to 3,473,000 inhabitants. Leaving aside the very city of Vienna population density in Niederösterreich is 80 inh./km^2 and in Burgenland 70 inh./km^2. So the settlement network of this part of Austria consists of the metropolis of Vienna (1,651,365 inh.) and of several towns

Table 13

General characteristic of Carpathian settlements

Administrative unit	Urban settlements				Urban population	Rural population	Total population	Urbanization index (%)	Area (km^2)	Population density (inh./km^2)
	above 500,000 inhab.	100,000 – 499,999 inhab.	20,000 – 99,999 inhab.	below 20,000 inhab.						
AUSTRIA										
Bezirk Bruck an der Leitha	0	0	0	3	16,693	23,313	40,006	41.7	495.0	81
Czech Republic										
Jihomoravský kraj	0	1	5	16	621,641	508,717	1,130,358	55.0	7,196.0	157
Zlínský kraj	0	0	5	15	325,649	265,057	590,706	55.1	3,963.0	149
Olomoucký kraj	0	1	3	9	329,455	309,706	639,161	51.5	5,267.0	121
Moravskoslezský kraj	0	1	11	21	939,941	310,828	1,250,769	75.1	5,427.0	230
HUNGARY										
Békés	0	0	4	12	267,303	131,999	399,302	66.9	5,631.1	71
Borsod-Abaúj-Zemplén	0	1	2	14	398,284	352,538	750,822	53.1	7,247.2	104
Csongrád	0	1	3	4	299,666	118,908	418,574	71.6	4,262.7	98
Győr-Moson-Sopron	0	1	2	4	236,154	192,388	428,542	55.1	4,088.7	105
Hajdú-Bihar	0	1	2	14	402,242	142,340	544,582	73.9	6,210.6	88
Heves	0	0	3	4	139,803	185,329	325,132	43.0	3,637.4	89
Jász-Nagykum-Szolnok	0	0	4	12	273,991	143,017	417,008	65.7	5,581.7	75
Komárom-Esztergom	0	0	4	4	191,400	122,958	314,358	60.9	2,265.1	139
Nógrád	0	0	1	5	98,248	123,394	221,642	44.3	2,544.2	87

Count. Table 13

Administrative unit	Urban settlements				Urban population	Rural population	Total population	Urbanization index (%)	Area (km^2)	Population density (inh./km^2)
	above 500,000 inhab.	100,000–499,999 inhab.	20,000–99,999 inhab.	below 20,000 inhb.						
Pest	0	0	11	16	496,891	570,690	1,067,581	46.5	6,393.5	167
City of Budapest	1	0	0	0	1,712,677	0	1,712,677	100.0	525.2	3,261
Szabolcs-Szatmár-Bereg	0	1	0	18	271,672	314,486	586,158	46.4	5,936.5	99
POLAND										
Krakowsko-Tarnowski	0	1	5	25	528,098	873,475	1,401,573	37.7	7,385.0	190
Nowosądecki	0	0	5	18	362,103	750,618	1,112,721	32.5	7,478.0	149
City of Kraków	1	0	0	0	733,439	0	733,439	100.0	327.0	2,243
Rzeszowsko-Tarnobrzeski	0	1	4	18	534,284	624,715	1,158,999	46.1	7,512.0	154
Krośnieńsko-Przemyski	0	0	5	17	339,939	608,848	948,787	35.8	10,332.0	92
Częstochowski	0	1	1	6	332,986	203,748	536,734	62.0	3,047.0	176
Bielsko-Bialski	0	1	3	6	340,732	304,595	645,327	52.8	2,352.0	274
Centralny Śląski	0	9	16	17	2,678,780	188,308	2,867,088	93.4	5,578.0	514
Świętokrzyski	0	1	5	24	614,477	680,988	1,295,465	47.4	11,708.0	111
Rybnicko-Jastrzębski	0	2	5	4	528,349	114,951	643,300	82.1	1,354.0	475
ROMANIA										
Alba	0	0	5	6	224,036	161,478	385,514	58.1	6,242.0	62
Arad	0	1	0	7	233,341	228,403	461,744	50.5	7,754.0	60
Arges	0	1	3	3	315,198	335,304	650,502	48.5	6,826.0	95

Count. Table 13

Administrative unit	Urban settlements				Urban population	Rural population	Total population	Urbanization index (%)	Area (km^2)	Population density (inh./km^2)
	above 500,000 inhab.	100,000 – 499,999 inhab.	20,000 – 99,999 inhab.	below 20,000 inhab.						
Bacău	0	1	4	3	339,377	385,628	725,005	46.8	6,621.0	110
Bistrița-Năsăud	0	0	1	3	115,686	203,404	319,090	36.3	5,355.0	60
Brasov	0	1	4	5	448,470	147,307	595,777	75.3	5,363.0	111
Buzău	0	1	1	3	206,846	291,239	498,085	41.5	6,103.0	82
Caraş-Severin	0	0	2	6	188,800	145,060	333,860	56.6	8,520.0	39
Cluj-Napoka	0	1	4	1	435,722	230,661	684,383	66.3	6,674.0	103
Covasna	0	0	2	3	114,368	110,554	224,922	50.8	3,710.0	61
Dambovita	0	0	2	5	169,158	370,164	539,322	31.4	4,054.0	133
Gorj	0	0	2	5	163,905	222,985	386,890	42.4	5,602.0	69
Harghita	0	0	3	6	145,693	183,651	329,344	44.2	6,639.0	50
Hunedoara	0	0	7	7	377,365	112,507	489,872	77.0	7,063.0	69
Ilfov	0	0	2	2	73,423	203,441	276,864	26.5	1,583.0	175
City of Bucureşti	1	0	0	0	1,929,615	0	1,929,615	100.0	238.0	8,178
Maramureş	0	1	2	10	305,389	213,668	519,057	58.8	6,304.0	82
Mehedinți	0	1	0	4	148,422	158,866	307,288	48.3	4,933.0	62
Mureş	0	1	3	7	313,827	272,163	585,990	53.6	6,714.0	87
Neamț	0	1	2	2	223,144	349,111	572,255	39.0	5,896.0	97
Prahova	0	1	1	12	425,381	407,177	832,558	51.1	4,716.0	177
Satu Mare	0	1	1	3	173,012	199,921	372,933	46.4	4,418.0	85
Sălaj	0	0	1	3	101,784	147,410	249,194	40.8	3,864.0	64
Suceava	0	1	3	11	293,792	411,755	705,547	41.6	8,553.0	82
Timiş	0	1	1	7	414,273	246,898	661,171	62.7	8,697.0	76

Count. Table 13

Administrative unit	Urban settlements				Urban population	Rural population	Total population	Urbanization index (%)	Area (km^2)	Population density (inh./km^2)
	above 500,000 inhab.	100,000–499,999 inhab.	20,000–99,999 inhab.	below 20,000 inhab.						
Valcea	0	1	1	9	188,486	229,977	418,463	45.0	5,765.0	73
Vrancea	0	1	0	4	150,395	244,935	395,330	38.0	4,857.0	81
SERBIA										
Borski Okrug	0	0	1	5	80,556	65,985	146,541	55.0	3,507.0	42
SLOVAKIA										
Bratislavský kraj	0	1	1	5	501,970	101,729	603,699	83.1	2,052.6	294
Trnavský kraj	0	0	5	11	272,355	282,720	555,075	49.1	4,147.2	134
Trencianský kraj	0	0	7	11	342634	257,213	599,847	57.1	4,501.9	133
Nitrianský kraj	0	0	6	9	335,426	373,072	708,498	47.3	6,343.4	112
Zilinský kraj	0	0	5	13	355,024	339,739	694,763	51.1	6,808.4	102
Banskobystrický kraj	0	0	5	19	356,158	300,961	657,119	54.2	9,454.8	70
Presovský kraj	0	0	7	16	400,895	397,701	798,596	50.2	8,974.5	89
Kosický kraj	0	1	2	14	432,290	339,657	771,947	56.0	6,751.9	114
UKRAINE										
Chernivtsi Oblast	0	1	0	18	386,625	518,819	905,444	42.7	8,100.0	112
Ivano-Frankivsk Oblast	0	1	4	34	596,480	787,464	1,383,944	43.1	13,900.0	100
Lviv Oblast	1	0	12	64	1,554,232	1,010,508	2,564,740	60.6	21,800.0	118
Zakarpattia Oblast	0	1	4	27	462,383	780,582	1,242,965	37.2	12,800.0	97

Source: Author's construction.

with population above 20,000 inh. located along the main transport corridors leading westwards to Linz and southwards to Graz. A few hundreds villages and small towns belong to the rural settlements. Villages and small towns are more evenly distributed in the Northern part of the territory, on plains, whereas in the south they are concentrated along alpine valleys. Moreover the city of Sopron, the historic centre of Burgenland with its population of more than 50,000 inh. is now in Hungary.

One should note, however, that this territory covers mainly plains along the River Danube and around Neusiedler Lake as well as parts of Alps and it has little to do with the Carpathians, as a mountain range. Only a small hilly area between the Danube and the Leitha rivers belongs to the Carpathian Mountains. Administratively it is the district (Bezirk) Bruck an der Leitha. This small area covers 494.9 km^2 and it is inhabited by about 40,000 people. 3 small towns and 17 villages constitute its settlement network. As the very name indicates the adminis-

trative centre Bruck an der Leitha with its more than 7000 inh. is situated in the valley of Leitha. The second largest town, Hainburg an der Donau (above 5000 inh.) is located on the right bank of the Danube. The third and the smallest town, Mannersdorf am Leithagebirge is located further to south-west. Villages are located mainly along valleys of small streams. So, settlement in Austrian Carpathians has predominantly rural character (urbanization index 41,7%). A relatively low share of forests in the total area of the district (23%) also reflects its agricultural character.

5.2 Czech Republic

There are 4 regions in the Czech Republic belonging to the Carpathian Mountain range. They are located in the east of country and form a compact area, bordering Poland I North, Slovakia on the East and Austria I South. These administrative regions (looking from North to South) are: Olomoucký kraj with capital in Olomouc, Moravskoslezský kraj with capital in Ostrava, Zlinsky kraj- concentrated around Zlin (former Gottwaldov) and most to South – Jihomoravský kraj with its main city- Brno. Carpathian range, as it is occupies the eastern parts of the above regions the only exception is Zlinsky kraj which is located almost in whole Carpathian Mountains. Valleys of the upper Odra in the North and Morava in the South separate Czech Carpathians from other mountains and uplands of Czech Republic and constitute a transport corridor of international importance between Northern and Southern Europe.

The most urbanized area among above is Moravskoslezský kraj with the highest population density (230 inh./km^2) and highest urbanization index (75,1%). Due to the largest amount of towns and cities (12 with population over 20,000 and 21 with population below 20,000) it has also the greatest urban population which fluctuates about near 1 million inhabitants. It is caused by the presence of hard coal deposits in the area and all the heavy industry connected to it. An opportunity of work it offers is the factor that attracts people to the cities and towns of the region. The settlement network develops mostly in lower parts of Moravskoslezský kraj in the valleys of the rivers Odra and Morávka. They are located in the 2nd largest agglomeration in the Czech Republic, in Ostrava. It is simultaneously the biggest agglomeration in the Czech part of the project area. Apart from the very city of Ostrava it consists of many cities and towns of the coal mining area extending eastwards to the Polish border. Havirov, Petrvald, Orlova and Karvina are secondary urban centres of the agglomeration. Along with the increase of height decreases the number of settlements and their population (harder climate conditions, poorer soils, less possibilities of production or creation- it all leads to one conclusion: less available workplaces).

Although Moravskoslezský kraj is the most urbanized area, it is not the most populated one. Jihomoravský kraj has the largest population (1.3 million inh.) and also the greatest area (7,196 km^2). Its population density is on level much approximately ont he same level as the rest of area (about 150 inh./km^2). This similarity refers also to the urbanization index, which amounts, for remaining three areas, to about 55–50%. Besides, a greater balance between urban and rural (with a slight advantage to urban) population is to observe. Over the half of the urban population of this region is gained due to the city of Brno (it is famous for its university: the 2nd largest in the whole Czech Republic) which has over 300,000 inhabitants. Jihomoravský kraj has the lowest location among the considered regions but there are considerably less cities than in Moravskoslezský kraj. Most small settlements are concentrated in the Southern part of the region, larger cities are located around capital Brno, in a circle that stretches out to the borders of the region.

Zlinsky kraj and Olomoucký kraj are similar when it comes to the characteristics, such as urban-rural population and urbanization index. Concerning their area the differencies are more noticeable (Olomoucký kraj has about 5,200 km^2 whereas Zlinsky kraj is nearly 1,300 km^2 smaller). This fact affects, of course, the population density which is greater in Zlinsky kraj. This area has also a better developed network of towns with a population below 20,000 inh., however, there is no city greater than 100,000. Most of the largest cities like, Prostějov or Přerov in Olomoucký kraj, are concentrated towards the neighborhood of Olomouc and crossing it railways. Smaller settlements are spreading rather north. Zlinsky kraj is similar; large cities (Uherské Hradiště, Kroměříž) are situated near the regional center of the city of Zlin and in the direct neighborhood of railways in the valley of river Morava. Towns and villages are specific to the high located areas of the Carpathian Mountains, their majos part is to be found in Zlinsky kraj.

5.3 Hungary

The part of Carpathians situated in Hungary constitutes about 4.3% of the total area of the Carpathians. Concerning the Carpathian development region only 4 Northern Hungarian counties have some of the Carpathian Mountain ranges on theirs areas (Pest, Nógrád, Heves and Borsod-Abaúj-Zemplén). All of them are part of the Inner-Western Carpathians. The other counties are mostly situated on Hungarian Great Plain and have little to do with Carpathians in geographic sense.

The main Hungarian city situated in the CDR is of course Budapest capital of the country, which is an administrative district in its own right. Budapest is located on both sides of River Danube that is one of the main transport routes, not only for Hungary. There are more than 1,700 thousand inh. living in Budapest on

525.16 km^2 that gives more than 3.2 thousand inh./km^2. Budapest is not only a large centre of industry, science and trade and financial business, but it is also a great tourist and cultural site with excellent communication and accessibility.

Furthermore, there are 5 cities with a population above 100 thousand inh. in the Hungarian part of the CDR (Debrecen, Miskolc, Szeged, Győr and Nyíregyháza), but only Miskolc is located in the Carpathian area in geographic meaning. The city is situated on Eastern side of Bükk Mountain, in the valleys of 3 rivers. Mikolc is the third (after Budapest and Debrecen) industrial city in Hungary. The city has also many higher education institutions and is a health resort with the famous cave bath place in Miskolctapolca district.

There are 36 towns situated in the CDR in the third populate range (20–99 thousand inh.). Nearly half of them is located in counties belonging to the Carpathians (11 in Pest, 3 in Heves, 2 in Borsod-Abaúj-Zemplén and 1 in Nógrád). Talking about smaller towns (below 20 thousand inh.) 39 of them are situated in Carpathian counties (16 in Pest, 14 in Borsod-Abaúj-Zemplén, 4 in Heves and 5 in Nógrád).

Pest that surrounds the capital of Hungary is also the county with the highest (besides Budapest) population (more than 1 million inh.) and population density (that is 167 pers./km^2). The lowest amount of inhabitants per km^2 is in county Békés, in the Hungarian Great Plain next to the border with Romania.

Taking the amount of urban and rural population into consideration, urbanization index had been analyzed. The highest index (besides Budapest) is in Hajdú-Bihar and Csongrad that are situated on Great Hungarian Lowland. If we are talking about mountainous region, only Borsod-Abaúj-Zemplén has an index above 50%; in the other 3 counties 43–47% of the people live in urban areas.

Generally, the Hungarian part of the CDR is occupied by more than 7 million inhabitants. 60.6% of them lives in some urban areas. There are 149 cities and towns and more than 1.4 thousand villages in the Hungarian part of CDR. The settlement density is the highest in Nógrad and Borsod-Abaúj-Zemplén, next to the Slovakian border (about 5 settl./100 km^2). The lowest figures (about 1,3 settl./100 km^2) are observed in Eastern Hungary near to Romania (counties Hajdú-Bihar, Békés, Csongrád).

5.4 Poland

This section concerns the southern part of Poland which is located in the Carpathian development region. This region covers ten subregions on the level NUTS3; Krakowsko-Tarnowski, Nowosądecki, City of Kraków, Rzeszowsko-Tarnobrzeski, Krośnieńsko-Przemyski, Częstochowski, Bielsko-Bialski, Centralny Śląski, Świętokrzyski and Rybnicko-Jastrzębski. It has to be pointed out

that the real Carpathians cover only part of the region mentioned above. It covers three subregions; Nowosądecki, Krośnieńsko-Przemyski, Bielsko-Bialski and parts of three others; Krakowsko-Tarnowski, City of Kraków, Rzeszowsko-Tarnobrzeski.

Among the subregions which are located in the real Carpathians, Krośnieńsko-Przemyski subregion has the biggest territory (10,332 km²) and has the lowest population density (91.8 inh/km²). The highest population density is in Bielsko-Bialski subregion (274.4 inh/km²) which is the smallest one (2,352 km²). This subregion is the only one among those, located in the real Carpathian area with a city that has a population above 100,000 inh. (city of Bielsko-Biała – 176 987 inh.). On the other hand it has the lowest number of cities (10) comparing to Nowosądecki subregion (23) and Krośnieńsko-Przemyski subregion (22). Bielsko-Bialski subregion has the highest urbanization index: 52.8% of population is living in cities, comparing to 32.5% in Nowosądecki subregion and 35.8% in Krośnieńsko-Przemyski subregion. The last one has the highest number of villages: 988 compared to 240 in Bielsko-Bialski subregion.

Subregions which are partly located in Carpathians have a higher population density: from 154.3 inh./km^2 in Rzeszowsko-Tarnobrzeski to 2242.9 inh,/km^2 in City of Kraków. All those subregions which have population above 100,000 inh. have one big city. The biggest and most populated city in the Polish part of the Carpathian development region is the City of Kraków (734,510 inh.). Two other cities are: Rzeszów in Rzeszowsko-Tarnobrzeski subregion (157,702 inh.) and Tarnów in Krakowsko-Tarnowski subregion (116,487 inh.). The city of Kraków has the highest urbanization index: 100% of population is living in city, compared to 37.7% in Krakowsko-Tarnowski subregion and 46.1% in Rzeszowsko-Tarnobrzeski subregion. The number of villages is growing from Rzeszowsko-Tarnobrzeski subregion (829) to Krakowsko-Tarnowski subregion (1,445).

Out of the remaining subregions located in the Carpathian development region the most populated is Centralny Śląski (2,867,088 inh.) with a population density of 514 inh./km^2. Comparable population density is in Rybnicko-Jastrzębski subregion (475.1 inh./km^2), population density is mucl lower in Świętokrzyski subregion (110.7 inh./km^2) and in Częstochowski subregion (176.2 inh/km^2). Centralny Śląski subregion has the utmost number of big cities with population above 100,000 inh. (9) and cities with population between 20,000 and 99,000 inh. (16). The most populated city is Katowice (313,219 inh.). This subregion has also the highest level of urbanization: 93.4% of its population living in cities. On the other hand Świętokrzyski subregion has the utmost number of small cities (24) and villages (2,202).

The main result of the analysis carried out on the population in Polish part of the Carpathian development region is that utmost numbers of cities are located at the edge of the Carpathian area (Krakowsko-Tarnowski and Centralny Śląski

subregion). In mountain areas, because of natural conditions, the number of cities, inhabitants and population density decreases as elevation increases. What is more, the number of inhabitants and population density decline in SE direction. This is due to historical conditions like world wars, destructions and resettlements.

The highest population density is in the city of Kraków (2,242.9 inh/km^2) and Centralny Śląski subregion (514 inh/km^2). On the other side, there is Krośnieńsko-Przemyski subregion (111.7 inh/km^2) and Świętokrzyski subregion (110.7 inh/km^2).

There is a comparable number of cities with population below 100,000 inh. in subregions partly located in Carpathian area (Krakowsko-Tarnowski and Rzeszowsko-Tarnobrzeski – 52 cities all together) and those located in real Carpathian area (Bielsko-Bialski, Nowosądecki and Krośnieńsko-Przemyski – 54 cities altogether).

The highest level of urban population is in the city of Kraków (100%), Centralny Śląski subregion (93.4%) and Rybnicko-Jastrzębski subregion (82.1%). On the other hand the highest level of rural population is in Nowosądecki subregion (32.5%), Krośnieńsko-Przemyski subregion (35.8%) and Krakowsko-Tarnowski subregion (37.7%).

5.5 Romania

Approximately 55% of all Carpathians is in Romania: more than the half of the Eastern Carpathians and all the Southern and West-Romanian Carpathians. Because of the fact that Romanian Carpathians are curved, majority of Romanian counties are covered by some mountainous ranges.

Analyzing the settlement structure in the Romanian part of the Carpathian development region it is necessary to mention that some of the cities, towns or villages situated in the CDR have much more in common with Carpathians in the geographic sense than others (for example on one side: Braşov – the big city located between the Inner-Eastern Carpathians and the Southern Carpathians and on the other side: Bucaresti – the capital and largest city of Romania situated on Romanian (Valahian) Lowland, on both sides of the River Dambovita). Moreover, some settlements are located ont he River Danube near the Iron Gate (e.g. Drobeta-Turnu Severin, Orsova, Berzasca, Moldova Veche). However, the analysis is based on administrative units. That is why the analysis of Romanian settlement structure concerns not only the mountainous parts of counties but also the rest of their areas.

The main Romanian city, which is also an administrative unit in its own right, is Bucaresti – capital of Romania. There are nearly 2 million inhabitants living in Bucaresti on 238 km^2 that gives more than 8 thousand inh./km^2. Bucaresti is not

only one single city which fits the range above 500 thousand inh. living in, but it is also the most important industrial (processing industry) and business centre of Romania. Furthermore there are 18 cities with population above 100 thousand inh. in the Romanian part of the CDR. Many of them are very important as industrial and as transport centres (e.g. Arad, Braşov, Ploieşti, Piteşti, Sibiu, Ramnicu Valcea). Timişoara and Cluj-Napoca are also university centers. Hunedoara – situated in Western Romania (Transylvania) – is the county with the highest amount (7) of towns included to the third populate range (20–99 thousand inh.). However, Prahova, Suceava and Maramureş are the counties with 10 and more small towns (below 20 thousand inh.) located in.

Moreover Prahova is the county with the highest (besides Bucaresti) population (more than 800 thousand inh.) and population density (that is 176.5 inh./ km^2). It is quite understandable, because of the fact that it is near to the Romanian capital. Ilfov, in which Bucaresti is the administrative centre, has also very high population density (174.9 inh./km^2). The lowest amount of inhabitants per km^2 is in Caras Severin the county located in the Southern Carpathians next to the border with Serbia.

Analyzing the populations division to urban and rural, urbanization index has been counted (besides administrative unit Bucaresti that has 100% urban population). The highest index is in Hunedoara (77.03%) and Braşov (75.28%). Moreover almost all Transylvania (exempt of North-West Romania – counties: Satu Mare, Bihor and Salaj) has an urbanization index of higher than 50%. The counties belonging to Banat, Valahia (exempt Prahova and Bucaresti) and Moldovia have indexes lower than 50%. The least urban population is in Ilfov that surrounds Bucaresti (26.5%). There are rather small villages located along roads running to Piteşti, Ploieşti or Buzău. There are also many interesting, in the ethnographic context long villages, located in the wide valleys (called "cimpulung") in the Eastern Carpathians.

Romanian settlements are mostly inhabited by Romanian people. However there are places where majority of the inhabitants speaks Hungarian. For example, in Harghita (county located in the middle of Romanian part of Eastern Carpathians) more than 80% inhabitants speak this language. More than 90% of inhabitants speak Hungarian in the smallest town of Romania – Baile Tusnad. Hungarians are the biggest national minority in Romania settled especially in Transylvania.

Generally, the Romanian part of the CDR is occupied by nearly 15.5 million inhabitants. Romania has a very differentiated settlement structure. People live rather in or near the centers of industry than in mountainous villages or on Romanian edges. The highest settlement density is in Northern county Maramureş and in Central Romania – county Prahova and small subregion the surrounding industrial town of Medias. Towns and villages are mostly located along the main roads

or around industrial centers. Concerning the CDR more than the half of Romanians live in urban areas. 12.5% of the total amount of inhabitants living in the Romanian part of the CDR lives in Bucaresti.

5.6 Serbia

Borders of Carpathian development region (CDR) adopted for the purpose of this project cover significant part of Serbia extending far behind what is usually defined as Carpathian Mountains. Ten NUTS3 units, called in Serbian okrug, and districts either names are included in the project area. These are: North Banat District; Central Banat District; South Banat District; City of Belgrade; Podunavski District; Branicevski District; Pomoravski District; Borski District; Zajecarski District; Nisavski District. This way outlined project area is inhabited by almost half of Serbia's population. It includes also the capital city of Belgrade with more than 1.5 million people. Secondary urban centres of this territory are: Nis, Smederevo, Pancevo and Zrenjanin.

As regards the Serbian part of the Carpathian Mountains it stretches southward from the Iron Gate Danube bent in the eastern part of the country. Morphological structure of the mountain range fits relatively well the administrative boundaries of Borski district. So the settlement pattern of this district reflects well the characteristics of the Serbian Carpathian settlements.

Borski district is relatively sparsely populated – 42 inh./km^2. Settlement network consists of 6 urban settlements and 84 villages. The majority of people lives in urban areas (55%). The principal city of the districts has 39 thousand inhabitants. It is significantly bigger than other towns of the district due to the fact that it has been developing since the beginning of 20th century as copper mining centre. The remaining 5 towns are of small with population below 20 thousand. Among them Majdanpek is another mining town in the district.

Rural settlement networks in Borski district consists of 84 villages. They are situated along the Danube valley which is simultaneously the border between Serbia and Romania. Similarly valleys of small rivers are also places where villages have developed using the wider, more flat parts of the valleys with relatively better conditions for agriculture.

5.7 Slovakia

Slovakia is the only country included as a whole into the Carpathian development region. Moreover mountains and hills of the Carpathian range cover the country

except for plains in the very south and south east. The settlement network of this country consists of 138 cities and towns and 2,753 villages. The following characteristic of Slovakian settlement network is based on data for 8 NUTS3 territorial units called in Slovalk kraj, including Bratislavský kraj, which encompasses only the capital city of Bratislava with its vicinity. Leaving aside the capital, the density of population which goes in pair with settlement density spans from 70 inh./km^2 in Banskobystrický kraj to 134 inh./km^2 in Trnavský kraj. The level of urbanization is differentiated as urbanization index varies from 47% in Nitrianský kraj to 57% in Trencianský kraj. Certainly Bratislavský kraj is the most densely populated (294 inh./km^2) and the most urbanized (urbanization index 83%).

As far as urban settlements are concerned, there are two big cities in the country: the capital city of Bratislava with population of 425,000 and the regional centre of eastern Slovakia Košice, with population of 235,000. All other cities in Slovakia have less than 100,000 inhabitants. The number of cities with a population between 20,000 and 100,000 inh. varies from 1 in Bratislavský kraj to 7 in Trencianský kraj and in Presovsky kraj. Towns below 20,000 inh. are more numerous and their number spans from 5 in Bratislavský kraj to 19 in Banskobystrický kraj. The overall number of urban settlements (excluding Bratislavský kraj which consists mainly of the capital) spans from 15 in Nitrianský kraj to 24 in Banskobystrický kraj.

Rural settlements are almost equally important as cities and towns as they provide home for 44% of Slovaks. For obvious reasons it plays only a marginal role in Bratislavský kraj where 66 villages are located around the city of Bratislava. In other regions, the number of villages varies from 235 in Trnavský kraj to 643 in Presovsky kraj. The density of rural settlements counted as number of villages per 100 km^2 varies from 3.2 in Bratislavský kraj and 4.4 in Zilinský kraj to 7.2 Presovsky kraj. Bearing in mind that in the neighboring Kosicky kraj it is 6.3 it is evident that the density of rural settlement is significantly higher in eastern Slovakia than in other parts of the country. Slovak villages have usually compact shape with a few single farmsteads scattered far from the main built-up area. It results from cultural tradition as well as from the fact that the collectivization of farming during the communist period prevented the sprawl of farming settlements.

Slovakia is a typical mountainous country. Therefore relief to high extent determines spatial pattern of settlements. Two major urban centers (Bratislava and Košice) and several cities of secondary importance (e.g. Trnava, Nitra, Michalovce) are located at the foothill of the mountains. Except for small, flat areas in the south and south-east of the country rural and urban settlements are concentrated along valleys of the main rivers. River valleys provided favorable conditions for rural settlements due to their fertile soils as well as for urban set-

tlements as natural transport corridors. Initially it was mainly rafting transport and later also road and railway transport. The longest chain of settlements has developed along the Vah valley with the following cities: Liptovský Mikuláš, Ružomberok, Žilina, Považská Bystrica, Dubnica nad Váhom, Trenčín, Nove Mesto nad Vahom, Piest'any. Similar but shorter are chains of settlements along other rivers e.g. Hron – with the cities of Brezno, *B*anská Bystrica and Zvolen; Poprad – with Poprad, Kežmarok, Stará Ľubovňa, Plavec (downstream it continues in Poland with Muszyna, Piwniczna and Stary Sącz). Important urban centers have often developed in merging points of two or more river valleys e.g. city of Žilina has developed the point where two tributaries (Kysuca, Rajcanka) join Vah River. Due to their suitability for settlement development bowl shaped valleys are usually densely built-up and the density of population reaches there extremely high values – sometimes about 600 people per sq. km.

By contrast mountains are sparsely populated and there are no permanent settlements in the highest parts of the mountains. Human activity on this hight has been limited to seasonal grazing and to the construction of tourism facilities.

5.8 Ukraine

Ukrainian Carpathians that are the part of Eastern Carpathians occupy more than 14% of the area of all Carpathian Mountains. They are situated in the territory of 4 regions (oblasts): Zakarpattia, Lviv, Ivano-Frankivsk and Chernivtsi Oblast.

The settlement structure in the Ukrainian part of the Carpathian development region is very differentiated. Firstly, it is necessary to say that there are not only districts, cities, towns and villages as the main types of settlements, but there are also other urban settlements like e.g. town type villages. For the purpose of this analysis, inhabitants living in each urban type settlement were included to the final amount of urban population.

The main Ukrainian city in the CDR is Lviv – the biggest city of Western Ukraine, very important historic and cultural centre of Eastern Europe. There are more than 730 thousand inh. living in Lviv. Furthermore there are 3 cities with a population above 100 thousand inh. in the Ukrainian part of the CDR (Cernivci, Ivano-Frankivsk and Uzhorod). Cernivci is the most populated city among them (242.25 thousand inh.) and the only one in Chernivitsi Oblast with more than 20 thousand inh. Ivano-Frankivsk (situated in Ivano-Frankivsk Oblast) is also a big city with more than 200 thousand inh. It is developed especially in light industry. In Zakarpattia Oblast there is also one city with more than 100 thousand inhabitants – Uzhorod. Very important international railway connecting Lviv with Budapest runs through the city (so called The First Hungar-Galician Iron Railway).

Lviv Oblast – situated in Western Ukraine – is not only the region with the highest amount (12) of towns belonging to the third populates range (20–99 thousand inh.), but it has also the highest amount of small towns (below 20 thousand inh.) – 64. Moreover Lviv Oblast is the region with the highest population (more than 2.5 million inh.) and population density (that is 117.6 inh./ km^2) in the CDR. The amount of inhabitants is the lowest in Chernivtsi Oblast (905,4 thousand of inh.) but the lowest population density can be observed in Zakarpattia Oblast (97.2 inh./km^2).

Furthermore, if we are talking about population's division into urban and rural cathegories, the highest urbanization index is in Lviv Oblast (60.6%). The rest of Oblasts situated in the CDR have the index lower than 50%.

The highest number of villages is in Lviv Oblast (1,850 villages). If we add it to the amount of towns and cities we will achieve 1,927 settlements that will give us more than 8 settlements per 100 km^2. This is the highest index of settlement density in the CDR's oblasts. The lowest settlement density is in Zakarpattia Oblast that is the most mountainous region in the Ukrainian part of the CDR.

Generally, the Ukrainian part of the CDR is occupied by more than 6 million inhabitants. Lviv Oblast is the most populated region with the densiest settlement structure. Zakarpattia, as the main mountainous oblast, has the lowest index of population and settlement density. Beside high mountain ranges, towns and villages are rather evenly located. Concerning the CDR about 46% of the Ukrainians live in urban areas. Approximately 12% of the CDR's Ukrainian inhabitants live in Lviv.

5.9 Conclusions

Having researched the characteristics of settlements in each country in Carpathian development region, it is a time to present, in the following chapter, our findings concerning the whole project area.

The very first of them and the most evident one seems to be the difference between settlements of Carpathian Mountains and settlements located either at the foothills of mountains or completely outside Carpathian mountain range on plains or in other mountain groups (Alps, Balkans). Namely all metropolises and the vast majority of big cities (100,000–500,000 inhabitants) included into Carpathian development region belong to the latter category. E.g. Budapest, Bratislava, Krakow at the foothills and Belgrade, Lviv, Bucharest and Vienna located completely outside Carpathians. So settlement network of Carpathian Mountains consists predominantly of medium sized cities towns and villages.

The next feature of the settlements to point out is a relatively low level of urbanisation in the whole Carpathian range. Values of the urbanisation index quoted

in the table below usually fluctuate around 50% with significant parts of Romania and Ukraine as well as eastern part of Polish Carpathians where it is below 50%. However, if we exclude the above mentioned urban centres located outside Carpathians it would be much lower and probably the Czech Carpathians would also turn out predominantly rural. Mining regions are an exemption from this rule and they are always highly urbanised regardless of their location in the mountains e.g. Bor copper mining region in Serbia or outside the mountain range e.g. Ostrava and Upper Silesia coal mining region in Czech Republic and in Poland.

As regards the number of urban settlements below 100,000 inhabitants there is a visible difference between the Western Carpathians on one hand and the Eastern and Southern Carpathians on the other. The number of cities and towns of this size is significantly higher in Czech Republic, Poland, Slovakia and Hungary than in Romania. The highest numbers in Ukraine result mainly from the fact that Ukrainian NUTS3 units (oblast) are much larger so more settlements fall within their borders.

The influence of natural environmental features namely the network of navigable rivers and the relief on the spatial structure of human settlements in the project area. Danube river links four capital cities in the project area: Vienna, Bratislava, Budapest and Belgrade. Other rivers which constituted axis for settlement development are Vah, Morava (in Czech Republic), Mureş. The mountainous relief of Carpathians cause the concentration of human settlements (urban as well as rural) in valleys of rivers and streams where land is more suitable for construction and for agriculture. Together with an irregular rainfall pattern it leads to the fact that floods endanger many settlements across the project area.

Traditional trade routes which had greatly contributed for centuries to the settlement development and to the development of economic links between cities (which often took form of market chains) are now less noticeable in the current spatial structure of settlements. Indeed they are visible only where modern transport corridors (railways and roads) developed along ancient routes. One of the best examples of this sort of settlement concentration is an almost continuous belt of rural and urban settlements between Krakow and Lviv along foothills of the Carpathians.

As rural settlements in many areas of the Carpathians (especially in Romania) provide home for more than the half of the population they are equally important as urban ones. They differ very much in terms of spatial patterns pending on cultural traditions and effects of collectivisation processes as well as in terms of size, economic prosperity and quality of life. Therefore special attention should be paid to multifunctional development of rural settlements while formulating final conclusions, recommendations and policy guidelines in the end of the project.

6 The demographic features of the Carpathian region

The macro-region of our analysis has 56 million inhabitants, of them nearly 8 million live in a capital city (Budapest, Vienna, Bratislava, Bucharest and Belgrade). Apart from the most densely populated urban areas (Bucharest is an extremely densely populated city with 8,000 inhabitants per square kilometre) the region's average population density is 100 per square kilometre. The most sparsely populated areas are the Western region of Romania and the central parts of Romania with Hargitha and Kovászna counties populated mostly by Hungarian ethnic minorities and the majority of Serbian regions. Burgenland is also a sparsely populated region.

The population of the research area has decreased by 800 thousand during the past 5 years losing one and a half percent of the total population. By monitoring the population change of some NUTS2 regions two characteristic trends may be observed.

There are significant regional differences in the decrease of population. The decrease of the population is significantly exceeding the national average in the majority of Romanian counties especially in the southern and western parts and in the research territories of Serbia.

Significant population growth can be observed only in some economically advanced areas, the decreasing population of Budapest and Bucharest can be explained by suburbanization, which is verified by the significant population growth of their neighbourhood (Pest County and Judetul Ilfov). Besides these two suburbanizations only the Hungarian Győr-Moson-Sopron County, the Polish Kraków region, Vienna and Belgrade can show worthy of note population growth.

The region's age structure can be characterized by a balanced ratio of young and old generations, although the ratio of the below 15 year old population shows a slight prevalence over the age group of over 65 (*Table 14, Figure 2*).

Table 14

The age structure of the research area (2004)

Age group	Ratio (%)
0–14 years old	16.7
15–65 years old	68.6
Over 65 years old	14.7

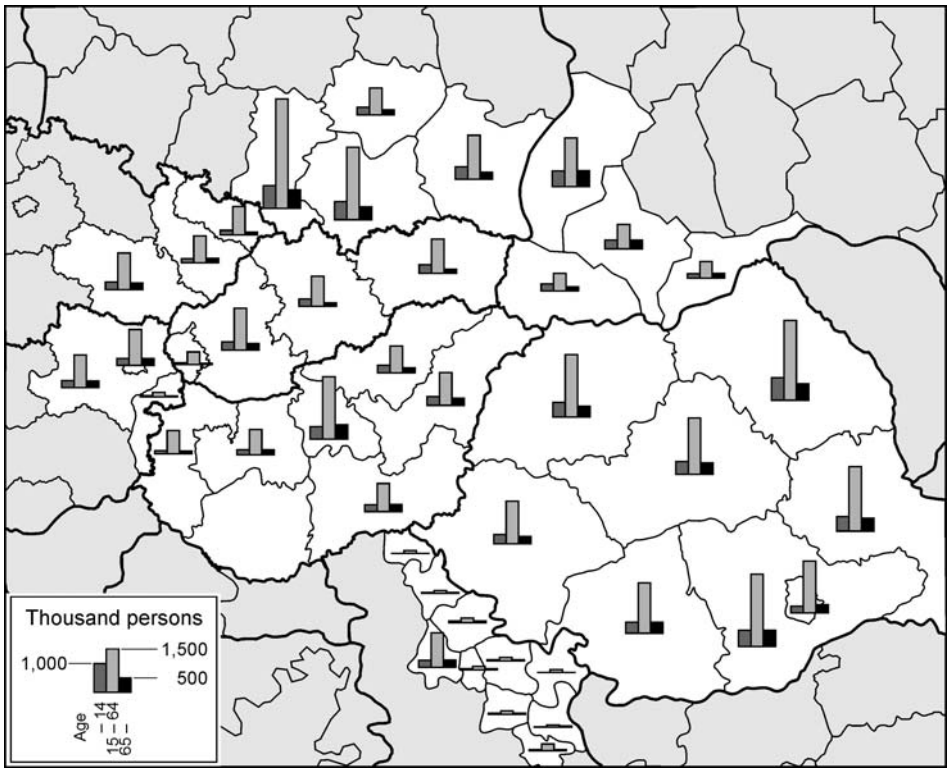
Source: Eurostat.

Regional level data are showing great differences. Several economically advanced regions have ageing population. Besides the Austrian provinces the population of Central-Hungary, West-Transdanubia and of the neighbourhood of Bucharest in Romania is ageing. The southern parts of Serbia, the macro-region's economically backwarded territories have malformed demographic structure with a predominant ratio of old-age population.

However in the majority of regions in our research area the ratio of young generation overweighs the old-aged one. This is extremely true in all the Polish regions, and in the central and northern regions of Romania.

Figure 2

The age structure of population in the member regions of the Carpathian region (2004)



Source: Eurostat, national statistical yearbooks.

The region's demographic process shows a strong natural decrease. The number of births in the majority of the territorial units of our research area stays below the number of deaths. The most affected areas of natural decrease are the counties of Hungary, the southern parts of Romania, Burgenland and Serbia. On Serb territories the extremely high death rates are the major causes of natural decrease. Death rates are also higher than the average in the majority of Hungarian counties and Romania, where even high birth rates cannot keep the rate of natural decrease low.

In the regions of Poland due to high birth rates and to the relatively low death rates a natural increase of population can be observed on NUTS3 level. Although Slovakia and the Czech Republic are also hit by the natural decrease they are in a better situation and even in some eastern counties of Slovakia a natural increase of population was observed. While in Poland the number of births can partly be explained by the influence of religion in Eastern Slovakia the high ratio of Roma population also increases the birth rate indicators (*Table 15*).

It should be noted that microregional level analyses would show a more differentiated picture on demographic processes and their future trends (*Veres,* 2006; *Szalay,* 2004).

The region's demographic processes have negative impacts not only on the overall economic development of the Carpathian region but they also generate unfavourable trends in social policy as well. The highest ratio of ethnic Roma population lives in the eastern parts of Slovakia where the number of settlements with majority or exclusive Roma population is rather high. All the current trends are predicting that the number and ratio of Roma population will further increase in these territories which will result in a concentration of inactivity, unemployment and in an increase of social tensions in these areas.

The population of *Romania* has shown a decreasing trend during the past twelve years which, besides the natural decrease of population, can be explained by the increasing migration as well. The drastically decreasing trend of births started in the late 1980s and stopped only just before the millennium stabilising the current rate. While at the end of the 1980s the annual average rate of live births was 15–16 per one thousand it dropped to less than 11 per one thousand.

The ratio of urban population is 54.8% of the total. The ratio of live births decreased both in urban and rural environment by 8.9 and 12.3 per one thousand. The ratio of internal migration is 12.3 heads per one thousand.

Table 15

Main demographic indicators of the Carpathian area (2004)

	Territorial units	Number of live births per 1000 inhabitants	Number of deaths per 1000 inhabitants	Natural increase or decrease
Austria	Mittelburgenland	7.8	11.6	–3.8
	Nordburgenland	8.3	9.5	–1.2
	Südburgenland	7.6	11.3	–3.7
	Mostviertel-Eisenwurzen	10.6	8.7	1.9
	Niederösterreich-Süd	9.4	10.4	–1.0
	Sankt Pölten	9.5	9.3	0.2
	Waldviertel	8.8	10.8	–2.0
	Weinviertel	8.2	11.5	–3.3
	Wiener Umland/Nordteil	8.3	9.4	–1.1
	Wiener Umland/Südteil	9.1	9.5	–0.4
	Vienna	10.5	9.9	0.6
Czech Republic	Jihomoravský	9.5	10.3	–0.8
	Olomoucký	9.3	10.0	–0.7
	Zlínský	8.8	10.1	–1.3
	Moravskoslezský	9.4	10.4	–1.0
Hungary	Budapest	8.8	13.5	–4.7
	Pest	10.5	11.7	–1.2
	Komárom-Esztergom	9.4	13.2	–3.8
	Győr-Moson-Sopron	9.2	12.1	–2.9
	Borsod-Abaúj-Zemplén	10.0	13.8	–3.8
	Heves	9.0	13.7	–4.7
	Nógrád	9.2	15.0	–5.8
	Hajdú-Bihar	10.2	12.0	–1.8
	Jász-Nagykun-Szolnok	9.5	13.7	–4.2
	Szabolcs-Szatmár-Bereg	10.7	11.9	–1.2
	Békés	8.1	14.4	–6.3
	Csongrád	8.8	13.6	–4.8
Poland	Krakowsko-tarnowski	9.4	9.0	0.4
	Nowosądecki	11.5	8.1	3.4
	Miasto Kraków	8.1	8.9	–0.8
	Częstochowski	8.2	10.7	–2.5
	Bielsko-Bialski	9.4	8.8	0.6
	Centralny Śląski	8.2	10.0	–1.8
	Rybnicko-Jastrzebski	9.3	8.2	1.1
	Rzeszowsko-Tarnobrzeski	9.8	8.1	1.7
	Krośnieńsko-Przemyski	9.8	9.2	0.6
	Świętokrzyski	8.7	10.3	–1.6

Count. Table 15

	Territorial units	Number of live births per 1000 inhabitants	Number of deaths per 1000 inhabitants	Natural increase or decrease
Romania	Bihor	10.3	13.7	–3.4
	Bistriţa-Năsăud	10.8	10.5	0.3
	Cluj	8.6	11.8	–3.2
	Maramureş	11.0	11.2	–0.2
	Satu Mare	11.0	13.5	–2.5
	Sălaj	10.4	14.5	–4.1
	Alba	9.4	12.4	–3.0
	Braşov	9.7	9.8	–0.1
	Covasna	11.7	11.2	0.5
	Harghita	11.1	11.5	–0.4
	Mureş	11.0	12.3	–1.3
	Sibiu	10.7	10.7	0.0
	Bacău	10.8	10.9	–0.1
	Neamţ	10.5	11.0	–0.5
	Suceava	12.4	10.8	1.6
	Buzău	9.5	13.0	–3.5
	Vrancea	10.3	11.8	–1.5
	Argeş	9.4	11.7	–2.3
	Dâmboviţa	10.1	11.7	–1.6
	Prahova	9.5	11.8	–2.3
	Bucureşti	2.6	3.0	–0.4
	Ilfov	15.3	18.9	–3.6
	Gorj	9.5	11.4	–1.9
	Mehedinţi	9.1	13.8	–4.7
	Vâlcea	8.9	12.4	–3.5
	Arad	9.2	14.2	–5.0
	Caraş-Severin	9.8	13.6	–3.8
	Hunedoara	8.8	12.5	–3.7
	Timiş	9.4	12.0	–2.6
Slovakia	Bratislavský kraj	9.1	9.4	–0.3
	Trnavský kraj	9.0	10.0	–1.0
	Trencianský kraj	8.4	9.5	–1.1
	Nitrianský kraj	8.3	10.7	–2.4
	Zilinský kraj	10.4	9.2	1.2
	Banskobystrický kraj	9.7	10.7	–1.0
	Presovský kraj	12.2	8.1	4.1
	Kosický kraj	11.8	9.6	2.2

Count. Table 15

	Territorial units	Number of live births per 1000 inhabitants	Number of deaths per 1000 inhabitants	Natural increase or decrease
Serbia	Grad Beograd	9.8	12.6	–2.8
	Central Banat	8.7	17.0	–8.3
	North Banat	9.0	17.5	–8.5
	South Banat	9.8	15.2	–5.4
	Podunavski	9.7	14.4	–4.7
	Branicevski	8.8	17.0	–8.2
	Pomoravski	9.0	17.2	–8.2
	Borski	7.8	16.3	–8.5
	Zajecarski	7.1	19.9	–12.8
	Nisavski	9.4	14.8	–5.4
Ukraine	Zakarpattia Oblast	12.4	12.4	0.0
	Lviv Oblast	10.1	13.1	–3.0
	Ivano-Frankivsk Oblast	10.7	12.9	–2.2
	Chernivtsi Oblast	10.6	13.1	–2.5

Source: Eurostat; National Statistical Yearbooks.

7 Education and employment in the Carpathian region

For several decades the ratio of young people with secondary education (ISCED 3 by the nomenclature of International Standard Classification of Education) has been showing an increasing trend in Europe. In the macroregion of our research the ratio of people with ISCED 3 qualification is slightly above the EU15 average. On the employment side there is an obvious correlation between unemployment and education. According to Eurostat data 4% of people with higher education (ISCED 5–6), 7% of people with secondary education and high-level professional qualification (ISCED 3–4), and 11% of people with primary education were unemployed in the EU15 countries. In the newly joined EU member states, including the Carpathian region, these percentage values were higher, particularly in the case of low educated people (CEDEFOP, 2003). To all these we must add that young people and women have lower opportunities for entering the labour market.

Young people are educated in different education and training systems in a diverse institutional framework, therefore their common problems are emerging in various forms. Consequently the management of the same problem may bring different outcomes in different countries.

Rising unemployment is a serious problem especially for young people: in some countries youth unemployment rate may go as high as 40%. However, the Czech Republic and Austria has low rate of youth unemployment (although it is showing a growing tendency in these countries as well). It is low-educated or professionally unskilled people who are the most badly hit by unemployment. East Central Europe including the Carpathian region has a growing tendency of youth unemployment but there are significant differences in this aspect among the member regions of the macro-region.

There are significant differences among the countries as well. In some countries the ratio of students of higher education dropped right after the regime change but it was followed by an increasing tendency. Today it occurs very rarely that a graduate training period is followed by lifelong employment. Actually graduate training is followed by retraining and frequent changes of employment. The countries of East Central Europe are very seriously hit by the problems described here (*Table 16*).

The majority of the unemployed have primary school or vocational school certificate only (in several regions this ratio is about 70%). In general, the education level of females is lower than of males. About two-thirds of rural population have primary school certificate only and this is in sharp contrast with the similar indicators of urban population. A dichotomy between the capital city and the provincial areas can be experienced in all the countries involved in our research. Although the general level of education has increased in long-term perspective the

Table 16

Education level in the Carpathian area (2004)

	Students at ISCED level 3 (GPV) – as % of all students at ISCED level 3 at regional level (approximately equivalent with GCE)	Students at ISCED levels 5–6 – as % of all pupils and students at regional level (approximately equivalent with BSc, MSc and PhD)
Czech Republic	*22.41*	*14.3*
Jihovýchod	21.75	17.5
Střední Morava	24.16	10.0
Moravskoslezsko	22.60	12.2
Hungary	*23.58*	*18.2*
Central-Hungary	20.97	27.1
Central-Transdanubia	25.08	12.7
West-Transdanubia	25.50	14.9
North-Hungary	23.18	14.9
Northern Great Plain	24.63	12.6
Southern Great Plain	25.59	15.7
Austria	*22.76*	*14.3*
Burgenland	25.45	2.9
Niederösterreich	23.39	2.4
Wien	18.12	33.0
Poland	*21.74*	*20.8*
Małopolskie	20.83	22.1
Śląskie	22.56	19.0
Podkarpackie	23.21	14.5
Świętokrzyskie	23.59	20.5
Romania	*23.67*	*15.1*
Nord-Est (SRE 2002)	22.81	10.7
Sud-Est (SRE 2002)	25.53	9.1
Sud (SRE 2002)	25.44	6.9
Sud-Vest (SRE 2002)	24.94	9.3
Vest (SRE 2002)	23.08	19.2
Nord-Vest (SRE 2002)	22.66	16.5
Centru (SRE 2002)	23.72	13.3
Bucureşti (SRE 2002)	21.69	38.7
Slovakia	*24.93*	*13.1*
Bratislavský kraj	22.30	31.8
Západné Slovensko	26.11	10.4
Stredné Slovensko	25.61	11.4
Východné Slovensko	22.41	8.8

Source: Eurostat.

difference between urban and rural areas has decreased only slightly and the differences within rural areas have remained significant. In areas with low education level there is an increasing threat of segregation. There are some microregions with very poor knowledge base in North-Hungary, in the peripheral areas of Romania, especially in the southern regions and in the border zones between Romania–Ukraine and Romania–Serbia.

For evaluating the macroregion's overall qualification level even using ISCED indices it is very difficult to carry out a comparative analysis by countries: they are very strongly determined by the overall level of the education system and some of its elements: the training demand and supply in a country and the customs and habits associated with them.

The ratio of people with secondary education (ISCED 3) (GCE) is by far exceeding the macroregion's average in Hungary. In Hungary GCE certificate is not recognised as professional certificate: it is nothing more than a prerequisite of higher education. It should also be mentioned here that in the EU the ratio of pupils visiting secondary vocational schools is higher than of grammar school students (54% and 46%). This shift between the types of secondary-level education may even be higher in certain countries of the macroregion – Austria, the Czech Republic and Slovakia – with 1/3–2/3 in favour of professional training, which is quite contrary to the practice of the southern EU states where 2/3 of the total pupils are visiting grammar schools and only 1/3 are studying at vocational schools.

8 Employment, unemployment

The economic activization of the population has an extreme importance both from social and economic aspects as for the majority of people this is the only way of earning regular income, and the ratio of active wage earners and dependants influencing the spending of incomes on household and social levels is also in strong correlation with this process.

The ratio of economically active population (the total number of employed and active jobseekers) within the total number of population (activity rate) is less than the European average. After its decline during the past years it slightly increased in year 2003 in the Carpathian region but still remained on low level, at about 55%. The regional differences between regional activity rates are presented by the table below. It should be noted that of the EU 25 countries the presence of Hungary's active wage earners is the lowest on the labour market. It should also be noted that a great number of jobs were ceased as a consequence structural crisis. Several members of the older generation having lost their job chose an early retirement or live as disability pensioners reducing in this way the statistics of unemployment. This is the main background of the low *activity rate*, as it cannot be explained merely by the number of children (see: low birth rate) (*Table 17*).

The economic restructuring in the region is well reflected by the labour market indicators as well. The employment ratio in the research area is lower but the unemployment ratio is higher than the European average. The number of employed people has significantly decreased since the 1990s.

There are large differences between the economic activity indicators of the territorial units of the Carpathian region. Regional indicators are reflecting national trends as well. In this field Hungary has the lowest economic activity with only 50.2% average and 45.6% (North-Hungary) and 54.5% (Central Hungary) values. The economic activity rates in the Slovak and Czech regions are approximately 60%. The ratio of economically active population increased in the Slovak regions which can be explained by the entry of fresh school graduates in high number into the labour market. This reduced the number of economically inactive persons (but increased the ratio of old-age pensioners).

In postsocialist countries the social system of the communist era regarded full employment as a priority objective. Several state provisions granted full employment for the economically active generations. This, on the one hand, provided a kind of social security for active wage earners but on the other hand lowered the economic efficiency of employment. The collapse of the socialist planned economy system generated massive unemployment in these countries, therefore nearly all member regions of this macro-region are facing this kind of historical heritage. Thus, now we are experiencing the outcomes of not only a

Table 17

Activity rates in the regions of our research area (2005)

Regions	Economic activity rate (15 years and over)		
	Total	Males	Females
	(%)		
Austria	*59.4*	*67.5*	*51.8*
Burgenland	56.9	65.8	48.4
Lower-Austria	58.9	66.8	51.6
Vienna	58.1	65.8	51.3
Čzech Republic	*59.4*	*68.7*	*50.7*
Jihovýchod	58.2	68.0	49.1
Střední Morava	57.9	67.6	48.8
Moravskoslezsko	58.5	66.1	51.3
Hungary	*50.2*	*58.3*	*43.1*
Central-Hungary	54.5	62.6	47.8
Central-Transdanubia	53.3	62.3	45.2
West-Transdanubia	53.7	62.0	46.2
North-Hungary	45.0	52.6	38.4
Northern Great Plain	45.6	53.8	38.2
Southern Great Plain	47.3	55.5	40.2
Polska	*54.9*	*62.8*	*47.7*
Małopolskie	55.9	63.7	48.8
Śląskie	52.2	59.4	45.9
Podkarpackie	54.3	60.5	48.5
Świętokrzyskie	54.3	61.9	47.1
Romania	*53.9*	*61.5*	*46.9*
Nord-Vest	51.9	58.1	46.2
Centru	50.4	59.1	42.2
Nord-Est	58.6	62.7	54.6
Sud-Est	51.6	61.3	42.3
Sud – Muntenia	54.9	64.1	46.4
Bucureşti-Ilfov	53.3	61.6	46.2
Sud-Vest Oltenia	57.1	63.9	50.7
Vest	51.4	60.4	43.2
Slovakia	*59.5*	*68.4*	*51.3*
Bratislavský kraj	63.9	71.3	57.4
Západné Slovensko	59.3	68.2	51.2
Stredné Slovensko	59.2	68.2	50.9
Východné Slovensko	58.1	67.6	49.3
Serbja	55,5	64,4	47,0
Ukraine	*62.2*	*68.2*	*56.8*
Zakarpattia Oblast*	64.5	70.3	59.0
Lviv Oblast*	61.2	65.7	56.9
Ivano-Frankivsk Oblast*	56.5	59.6	53.6
Chernivtsi Oblast*	60.3	65.6	55.5

*2006.

Source: Eurostat, national statistical yearbooks.

short-term economic breakdown or a transitional drawback of market positions, but the problem is much bigger: this is a failure of an economic and social policy run for several decades. Its negative impacts have emerged in a massive scale and simultaneously after the 1990s.

The primary reasons of the economic breakdown of post-socialist countries are stemming from the absence of earlier market mechanisms. The first phenomena of unemployment are correlating with the changes in the economic regulation systems: the ratio of unemployment was continuously increasing for ten years in the regions of our research area. Apart from a temporary period and certain special territorial units it started to decrease only after the millennium but the rate of decrease showed significant regional differences.

In these post-socialist countries the shutdown of big industrial plants and the collapse of agricultural cooperatives have resulted in a massive dismissal of employment surplus. On the demand side the following factors were increasing the ratio of unemployment:

- Tensions in industrial structure.
- The loss of earlier COMECON markets.
- The shrinking size of internal markets.
- The transformation of firms.
- The new proprietary structure and privatization of firms.

On the supply side the professional and language skills of employees were not meeting the requirements of the European economy. This created a mass of unskilled workers having no hope for finding a permanent job on the long run.

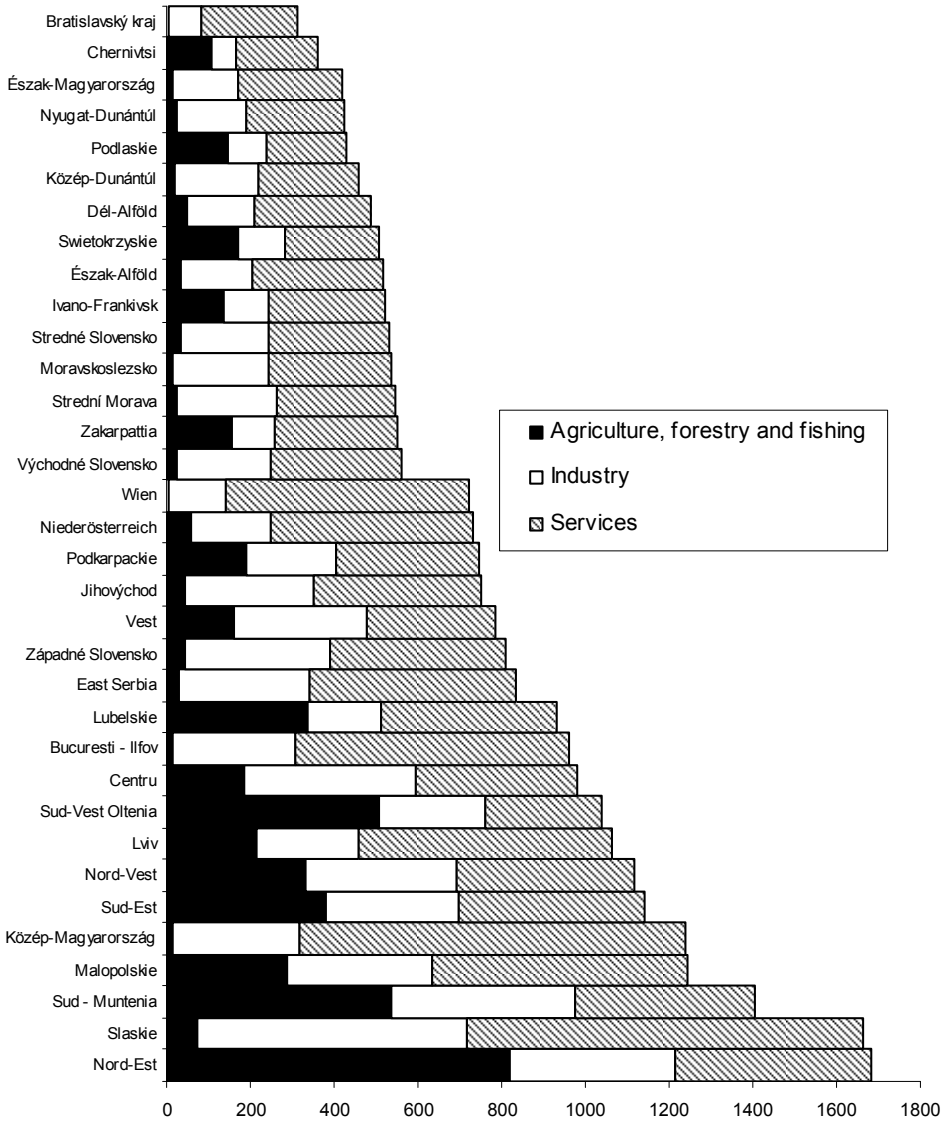
The dropdown of employment was uneven in the different economic sectors and regions. The highest drop rate of jobs can be observed in the primary sectors of economy (*Figure 3*).

In the countries of our research the decline of employment rate restructured the ratio of the three big economic sectors as well. The migration rates of labour force between the different economic sectors during the past 10–15 years are very close to the indices of the West European countries with advanced market economy. The ratio of people employed in the tertiary sector is approximately 60% in several regions. More than two-thirds of the total labour force are employed in the private sector (*Figure 4*).

Differences in employment are very high within the macro-region of our research. While in core areas unemployment rate is by far below the average in several NUTS3 areas unemployment rate is more than the double of the average but in some depressing regions it is over 20%. The most severely hit by unemployment areas are the south-eastern part of Slovakia, the Polish counties and some counties in Romania.

Figure 3

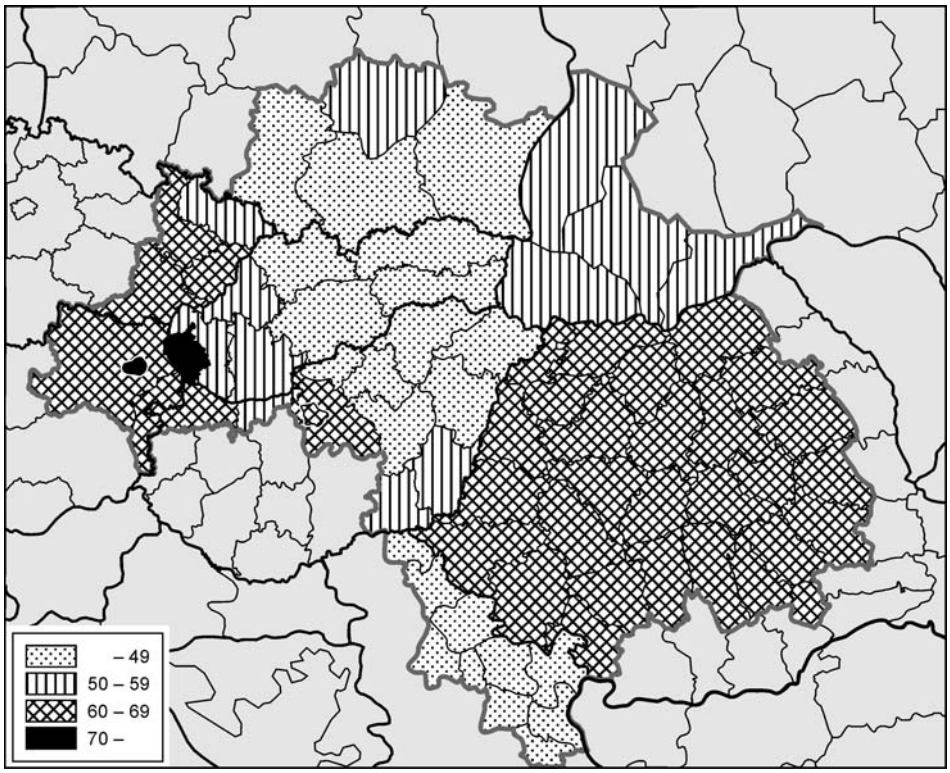
Employed persons (1000) by economic sectors in NUTS2 regions (2005)



Note: The 10 Serbian kraj altogether are called East Serbia.
Source: Eurostat, national statistical yearbooks.

Figure 4

The ratio of employed persons in the Carpathian region, % (2004)



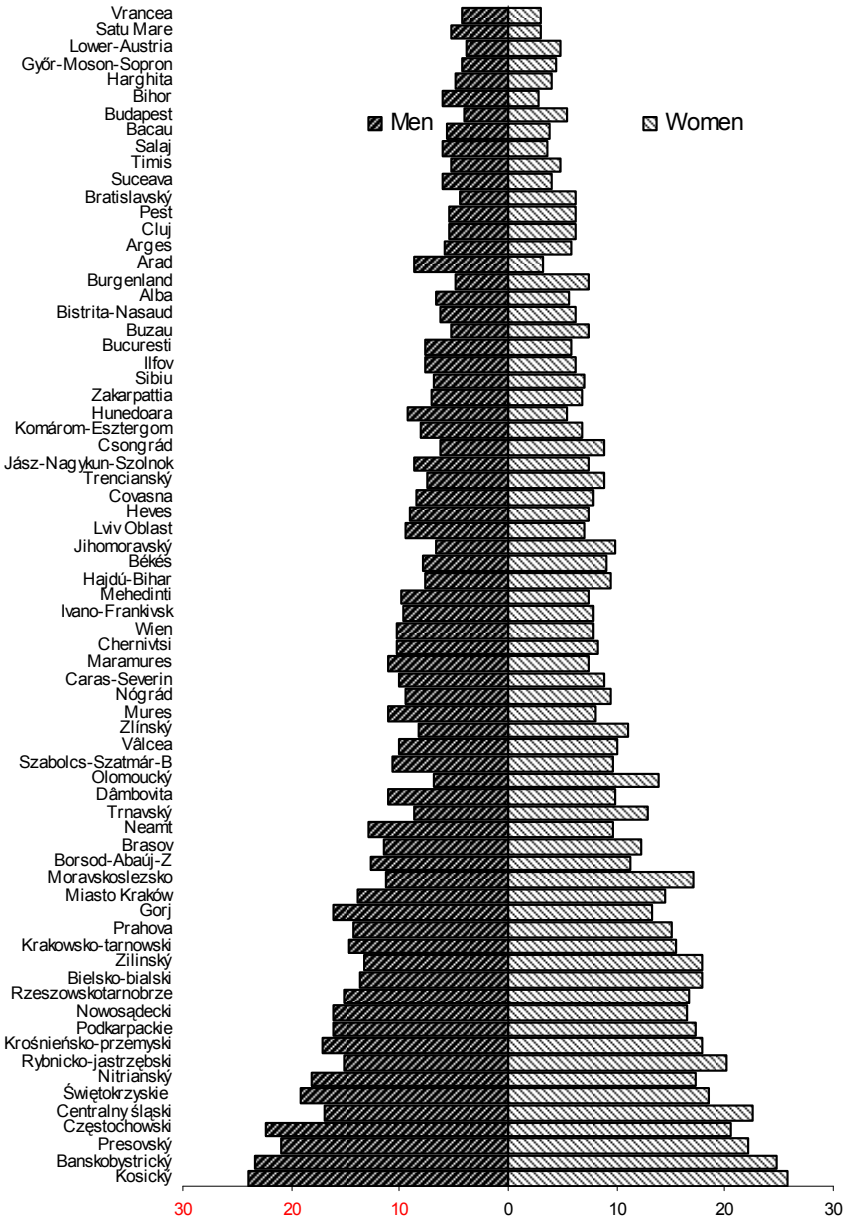
Source: Eurostat, national statistical yearbooks.

Roma population is in a very disadvantaged position from the aspect of employment chances by sex and etnicity. The ratio of Roma population is extremely high in lagging regions where poverty and poor physical access are further hindrances to their social integration process. Their return to the labour market needs carefully elaborated and customized measures and in the majority of cases they can work at state subsidized workplaces only (*Figure 5*).

The macro-region's economic restructuring and the massive employment change of population all contributed to the increase of migration. This can very well be verified by the outmigration of skilled labour force from east to west (brain drain). The macro-region's economic restructuring increased the mobility of labour force, especially of skilled labour force. This territorial shift of labour force is coinciding with the territorial shift of capital resources and assets (*Lelkes,* 2004).

Figure 5

Unemployment rates by sex (2005)



Source: Eurostat, national statistical yearbooks.

9 Transport in the Carpathians

9.1 The evolution of the transport network

The development of the vehicle-based transport network of the research/ evaluation area started with the building of railroad lines. The major features of railroad network are as follows:

Compared to West-Europe the first railways emerged here with a delay of some decades and until the 1880s their growth rate was much slower than in other parts of the civilized Europe.

The rate and the territorial structure of main railway lines composing the backbone structure:

- At the onset (until the Austro-Hungarian Compromise, but in several cases until the 1860s) were determined by the power interests of the Austrian Monarchy.
- Then they were shaped by the interests of the Austro–Hungarian Monarchy in several cases by the manifestation of the national, political and economic interests of the Hungarian Holy Crown Monarchy including certain regional and large corporate (mostly heavy industrial) interests as well.
- With the establishment of the Romanian Kingdom this interest structure was further diversified by another member;
- The Serbian Kingdom and following the Croatian Compromise Croatia and Slovenia were also doing their best for influencing the railway network building process by their own interests.

Hills and highlands, heavily increasing railroad building costs were excluded from railway routes for long periods and they were crossed by railway with a significant delay. These delayed developments are explained not only by heavy relative costs, and the lack of skills and technical instruments in building big railway structures (tunnels, viaducts, deep railway cuttings) but also by the sharp political conflicts between the Carpathian countries (they were especially hindering the planning of Transcarpathian pass railways). Apart from the short deadlocked railway lines of local importance, the first long-distance railway lines connecting regions and province seats were mostly departing from Vienna.

In the Carpathian Basin,

- Following river Danube the line was passing through Nové Zámky continuing to Budapest. Here the line was split into three sections (following its route to Debrecen, Békéscsaba–Oradea and Szeged–Timişoara).
- Passing through Sopron to Nagykanizsa.

Outside the Carpathian Basin the line was following the arch of the Carpathians from outside on Moravia and Polish territories through Galicia, Krakow until Cernovic in Bukovina then through Moldova until Constanța. These 'Charles Railways' had two missions:

- Holding the rebelling Hungarians in check at bay by a semi-circle of a high capacity railway line which would serve as a delivery route for the Austrian Army in case of a new Hungarian 'rebellion'.
- Decreasing the role of Hungarian agriculture in the agricultural supply of Austrian and Czech provinces with cereals/food by importing them cheaply from Transcarpathian areas. (The south-eastern branch of these railways was favouring Romania. Its strategic role remained the same during the 20th century. When the Soviet Union annexed Bessarabia in 1940 and the Soviet–Hungarian border was established on the backbone of the Carpathians – the German–Soviet Treaty preserved it as a normal gauge line between Germany and Romania its allied state – for maintaining direct transport connections for military, food supply and oil delivery purposes.)

Of the major railway routes departing from Hungary entering or passing through the Carpathian Mountains zone the following lines had primary importance from the aspects of economy and inter-regional cohesion:

- Budapest–Miskolc–Košice railway line.
- Košice–Vrútky–Odevberg (Prussia–Silesia) railway line.
- Hatvan–Salgótarján–Banská Bystrica railways.

The building of these three railway lines was motivated by the heavy economic interests of Upper-Hungarian (Gömör, Salgó-Rimamurány, Szepes counties) metallurgy and processing industry as it facilitated their cooperation in production with Silesia and opened new market areas.

The Vah Valley railways departing from Bratislava passing through the Tatras was another important railway line in Upper Hungary. Its north-western sideline to Silesia opened a new connection. The railway line departing from Košice passing through the straits of Prešov and Bardejov through Dukla Mountain Pass going to Galicia established a connection with the provinces of Austria in Poland.

For accessing Transylvania two alternative routes were taken into consideration from the onset:

- The railway line starting from Arad following the Valley of River Maros was demanded by the wealthy and highly civilized Saxon citizens of South-Transylvania.
- Other stakeholders preferred the Oradea–Crown Pass–Cluj-Napoca direction.

Although the Cluj-Napoca railways were the first opened some years later they could join the Maros Valley railways.

Romania was in bad need of an international railway connection with Western Europe passing through Hungary. Its route included an entry point to Hungary in Orsova at the Lower-Danube district just to keep the railway line starting from Bucharest on the territory of Romania as long as possible. However the Hungarian Government (from the same reason – i.e. to keep them on Hungarian territories and charging as high transit fees as possible) insisted on joining the two railway sections at Predeal Pass nearby to Braşov. Romania could not do anything but to obey the Hungarian demands and a new connection point was to built at Vercivora, a nearby place at Orsova, subsequently only to this connection.

On the main international railway line departing from Budapest and crossing the Carpathians Transcarpathian sections (through Verecke and Užok Mountain Passes towards Zemberg) were completed the last.

Of the countries situated outside the Carpathian area, Serbia was the first to be connected by railway along the Subotica-Belgrade railway line in 1886. (This had special importance in foreign trade as it was later extended to Saloniki and its eastern section connected Niš with Istanbul.)

By the end of the 19th century a radial system of international railway mainlines had been shaped around Budapest passing through the Carpathians and connecting the neighbouring provinces of the Austro–Hungarian Monarchy (Moravia, Czech-Silesia, Galicia, Bukovina), Germany (through Prussian-Silesia) and Romania (Moldova, Wallachia), Old-Serbia and with Rijeka through Croatia-Slovenia. The number of Transcarpathian transit railway lines was increased by some sidelines at the turn of the 19th and 20th centuries (through Turnu Roşu Mountain Pass in the Southern, Eastern and Northern Carpathians).

The extensive radial railway network of the Carpathians was opposed *by a very few number of transversal lines within the inner side of the Carpathians.* The most important of them in long-term perspective proved to be Hungarian North-Eastern Railways connecting Upper Hungary through Transcarpathia with North-eastern Transylvania/Maramureş since the 1870s. Beyond the Carpathians several lines are following the line of Carpathians within a distance of 50–70 kilometres (in Moldova and Wallachia) beyond those having already been mentioned.

Since the 1880s, the second half of the railway age, by the initiation of local railway companies 2–3 times longer railway sidelines have been built than the total length of main railway lines.

Local railway companies had two missions.

- Improving the general transport accessibility of peripheral area, providing inter-settlement service facilities for the population and
- Easing cargo transportation for forest companies, mines and industrial plants, making it cheaper and facilitating local economic development in

general (by transporting wood, salt, mined ores, coal, building materials and cereals etc. in railway carriages as bulk cargo). By purchasing stocks big landowners, mine and factory proprietors contributed to the majority of the costs of railway building almost everywhere but the building of some railway lines was fully funded by them (later on they were purchased by the Hungarian Railways).

The major features of the railway network of the Carpathian area before the First World War were as follows:

- Adapting to the lower population density and the less number of cities and in general to lower mobility and less cargo delivery the network has been created by far lower density than on the lowlands and hills of the Carpathian Basin. This low density is also true in the case of railway network in the hills of the Carpathians in Hungary.
- In provinces beyond the Carpathians, the density of railway network is by far lower than in the internal part of the Carpathians. This can mostly be explained by the lower financial power of local railway building companies who due to their organisation structure/legal background could create a smaller network (in Moldova, Wallachia, but even in Bukovina and Galicia) than their counterparts in Upper Hungary, Transcarpathia and Transylvania.

The new borders of Hungary (having been delimited by the Trianon Peace Treaty) and the new political division of space had the following impacts on railway network (which still has higher importance than road network):

- In the Eastern and Southern Carpathian regions the Transcarpathian railway lines turned from international into national ones (bearing interregional importance) which generated much higher demands for passenger and goods transportation between Transylvania and Regat in Romania. However on the increased territory of the Romanian state for maintaining economic/cultural cohesion only the modernisation of the existing railway lines (electrification, building double track lines) has taken place without building any new railway lines or new motorways between 1918 and 1944. Railway capacities increased between 1944 and 1989 and a motorway was built with enormous costs for passing Wallachia. The domestic air service was launched between the capital city (Bucureşti) and the major cities of Transylvania (Timişoara, Oradea, Sibiu, Cluj-Napoca, Târgu Mureş, Satu Mare, Baia Mare, Oradea etc.).

In Czechoslovakia, being formed as a new country in 1918, the east-west direction became the major route of domestic transport services between the two country parts. Therefore, the Prague–Puchov–Bratislava–Košice–Užgorod railway line was reconstructed and extended by some new short sections and the

roads of Váh and Hornád Valley were developed to the best quality. In the 1920s domestic air mail and passenger services were introduced on the route of Prague–Puchor–Bratislava–Košice–Užgorod as experimental services which have become regular with scheduled air services by the late 1930s. In the Slovakian part of Czechoslovakia railway services faced such a problem that the southern valleys of the country's eastern part with their economic centres (Rimavská Sobota, Lučenec, Rožňava) were oriented by traffic towards the core areas of the Carpathian Basin until 1918 but the central parts of the new Czechoslovakian state and Prague, the capital city, were hardly accessible by rail only by taking quite big roundabouts with poor technical facilities (allowing low speed traffic only). Although the idea of building a railway axis at the southern part of the country (Bratislava–Levice–Zvolen/Veľký Krtíš–Lučenec–Rimavská Sobota–Rožňava–Košice) was raised already in the 1920s its completion has still not been finished as only some of its sections have been built as parts of the main line.

The new western border of Romania set up after 1918 has cut the traditional interregional diagonal route of Historic Hungary at several places such as the Oradea–Rijeka railways (built as a route for bypassing Budapest in the exporting of the agricultural products of the Hungarian Great Plain to overseas markets) and the Oradea-Arad main line. For this reason additional new sections had to be built and the whole line had to be renovated for launching fast train services on the Oradea–Timişoara railway line. As a result of the common railway development programme of the Small-Entente states surrounding Hungary from the east and the south the Prague–Košice–Užgorod–Oradea–Timişoara–Belgrade railway line with its potentials of running fast train and big capacity cargo train services provided direct connections between the Small-Entente member states bypassing Hungary.

The period of state socialism after 1945 generated the following changes in the transport system of the Carpathian countries:

- In the international transportation of goods the orientation to the Soviet Union became dominant as a consequence of an extensive heavy industry development several million tons of raw materials (ores, alloying materials and artificial fertilizers), energy resources and fuels were imported and industrial products and food were exported to the Soviet Union. The most important consequence of this enormous eastward railway of traffic goods was the building of broad gauge railway lines starting from the borders of the Soviet Union and ending at quite a big distance.
  - In the southern part of Poland it ended at Sławków, Silesia (about 350 kilometres from the border)
  - In Slovakia it ended at the integrated metallurgy plants near Košice

Apart from broad gauge railway tracks several cargo transhipment zones with railway stations and parallel railway lines were built in the south-eastern part of Poland, in the eastern part of Slovakia and in the north-eastern part of Hungary within a 20–30 kilometre zone of the Soviet border. In the deeply underdeveloped agricultural zones they were core areas of regional development providing more qualified job offers, better wages, social infrastructure and official residence, secondary schools, better public services than the average level of their neighbourhood. These establishments (in settlements of Medyka, Ágcsurgó, Záhony, Unghery etc.) have preserved their employment centre character functioning as modern centres for goods transhipment but they were unfit for building local processing industry plants based on the raw materials and fuel delivered here in massive amount.

Although the increasing foreign trade among the Carpathian countries mobilized enormous amounts of goods, but very few steps were taken for the development of crossborder infrastructure. This is true whether we look at the railway transition areas of mountain rims, the technical development and the traffic capacity of border stations between Slovakia and the Carpathian section of Poland, or between Slovakia and Hungary or between Romania and Hungary. Some progress has been made in the electrification and building double tracks on some main line sections, but due to the negligence of sideline maintenance and the increasing density of cars, railway services have lost a lot from their attractive force. However, only a few railway lines with extremely low traffic have been terminated in South-Poland and North-Hungary but in the mountain regions of Slovakia and Romania this socially highly sensitive plan was not approved by the political government.

The development of the road system was different from the railway. Of the two levels of work

- the covering of main roads with asphalt was completed but international goods transportation traffic was moderate, and trucks were used as accessories for short-distance delivery but international passenger transport during the summer “top” seasons in some relations (e.g. between Slovakia and Lake Balaton or the transit traffic between Czechoslovakia and the Adriatic Sea) was very high even in the late 1960s. During the 1980s an increasing number of city bypass roads were built on main roads.
- Since the 1960/70s some motorways were built at certain places. Their majority was part of the TEN system initiated by Hungary and Poland connecting North-Europe with the Adriatic Sea and Asia Minor. In the Carpathian region only some sections (Vah Valley entry zone (until Piešťany) the Prešov–Košice section in Slovakia and in Poland some

short sections connecting big cities with the internal part of their agglomeration zone) have been completed until the change of regime.

- The governments of every Carpathian country were trying to stop the demographic deficit of their peripheral highland zones by building asphalt covered by-roads (link roads – to be usable by cars in all seasons – to connect the blind settlements of secondary road network). However, these steps could only slow down this process, but they were unable to halt the outmigration of the local population to cities and industrial zones. Small highland villages and settlement groups, stock breeding farms became victims of the economic restructuring. By now the number of highland herdsmen and woodcutters has dropped to a small fraction of the relative value of the 1980s. Workers were transported for motorized wood cutting from remote villages and small towns by buses of state companies or cooperatives daily or in certain periods.

9.2 The current situation of transport

The Carpathian region's transport has been affected by the changes of transport following the change of regime in the following ways and intensity:

- Of the main railway lines and roads too much funding has been allocated to the development of international corridors (Helsinki/PEN/TEN and partly TINA).
- The Bratislava– Žilina–Košice section of the 5/a corridor is under construction. A motorway has been built from Bratislava to Žilina in the Valley of River Vah and the section between Low-Tatra and High-Tatra (with a tunnel in Branisko) will also be completed soon. A significant progress has been made on the railway line of the same direction (some of its parts are suitable for maintaining a speed of 140–160 km/h and the line is electrified with double tracks) and the intercity train service between the two biggest cities of Slovakia has intensive passenger traffic.
- The 4th corridor between Berlin and Istanbul is serving Germany's interests (the railway connects Germany with one of its biggest market and labour force source). Two parts of this corridor cross the Carpathian region. On the Bratislava–Komárno–Budapest railway section the quasi high-speed train service can be introduced in 2007 and some sections of the Bratislava–Nitra–Zvolen dual carriageway have already been completed.
- The other planned part of the corridor is crossing South-Transylvania (along the Maros Valley) through the South-Carpathians reaching the Black Sea at Constanţa. The motorway is crossing the Carpathians at Turnu Roşu while

the corridor railway line at Predeal Pass. The Romanian section of the 4th corridor is under construction and its railway line is undergoing a partial modernisation.

- The M3 motorway in Northern Hungary a part of the 5th corridor, has practically been completed until Debrecen/Nyíregyháza area and its continuation towards Carpathian-Ukraine is being planned. Although there have been declarations on building it further until Kiev it is doubtful whether this project can be completed.
- A short part of the 10b (Budapest–Belgrade–Saloniki) corridor will touch Serbia, a country involved in our research. (It is merged into the 4th corridor at Belgrade.)
- The 9th corridor connects Helsinki with the Greek port of Alexandrupolis through Chişinău/Jassi (its section in Moldova is approaching the Carpathians).
- The Danube waterway is the 7th corridor but its navigation with ships above the capacity of EU economical threshold value (1350–1500 tons) called "European" ships is quite problematic on the Bratislava–Vác–Budapest section due to the low water level in the end-summer and autumn seasons. Although maintaining the continuity of navigation on the Slovakian-Austrian, Slovakian–Hungarian, Hungarian and Romanian/Bulgarian river sections is a priority task of the EU Quick Start Programme no major steps have been made so far for the achievement of this target.
- The other section of the 7th corridor in the riverbed between the South Carpathians and the Serbian Mountains is fairly well navigable thanks to dams of the two huge common Romanian and Serbian hydropower plants (Djerdiap I and II) rising the water level significantly. However the costs of shipping are increased by lockage fees.

The primary mission of corridors is providing quick transport facilities between capital cities/big economic centres (e.g. on Prague–Bratislava–Budapest–Trieste route) therefore they are serving as means for internal cohesion within the European Union as a complex system of transportation facilities providing quick access in several sub-sectors.

There are big differences in the completion stage of these corridors mostly depending on the level of their funding. Spectacular improvements were made in those projects that had received heavy sums funded from national resources and loans for implementation. (Until 2004 the EU funded the preparatory plans, feasibility studies, environmental impact assessments, and the guarantee interests of loans disbursed by the banks of the European Community. However, EU member countries may soon receive significant EU grants (e.g. from Cohesion Fund).

The territorial impacts of although with long delays compared to plans but after all being realised corridors are rather ambivalent:

While these corridors are significantly contributing to the increase of the free flow of goods and labour (and indirectly they are accelerating information and capital flow) at the same time they have a linear strong attractive force on their hinterlands generating effects of exhaustion and degradation on the other hand. Along these corridors several new plants of innovative industries and services were built with logistic and distribution centres attracting the potential labour force of the skilled young generation of their hinterland. The agricultural production segments in their neighbourhood produce high quality, transport intensive and valuable products (greenhouse flower and fresh vegetable farming, biotechnology based knowledge, intensive production methods etc.) with ageing population, critically high rate of unskilled labour force in the peripheral areas of corridors. The outmigration of qualified population will accelerate demographic erosion both in quantitative and qualitative aspects.

The air traffic centres of the Carpathian region, the big airports of capital cities are located at the edge or outside the region (Vienna-Schwechat with an annual passenger traffic of 17 million, Prague with 11 million, Budapest with 8 million, Bucharest with 3 million, Belgrade with 1.8 million, Bratislava with 1.5 million. Of regional airports the passenger traffic of Krakow is more then 2 million and of Katowice is exceeding the figure of 1 million. The annual air passenger traffic of Timişoara belongs into the category of 0.5–1.0 million, while of Košice and Clui (and Constanța) into the 0.3–0.4 million. The annual air passenger traffic of the remaining airports (Tirgu Mures, Oradea, Satu Mare, Sibiu, Bacău, Jassi, Succeava, Debrecen, Užgorod, Cernovitz, Posten, Sliac, Poprad-Tatry, Rzesov) is below 0.2 million (the majority has some ten thousands only annually). A growing number of regional airports are running international air services beyond the domestic ones (mostly in the summer tourist seasons by charter flights carrying tourists into the holiday resorts of the Mediterranean region).

9.3 The major problems of transport in the Carpathian region, weaknesses and alternatives for their solution

9.3.1 Side-roads in peripheries

Accessing highland settlements (villages, forest farms, mining sites and recreational villages) has one and only real alternative today (and possibly in the future): It is the network of public (and partially private) roads with technical parameters customised to current traffic situations and providing easy access to

magisterial roads. Although local stone for road building can easily and cheaply accessed from a short distance this has no relevance on the costs of road building as the building costs of road structures necessary for bridging the irregularities of the ground are increasing the total costs of road building to several times compared to the normal costs. Due to the expansion of motorized road transportation the number of traditional local instruments of wood transportation (long lumber slides, cable ropeways and narrow-gauge wood transportation railways) has strongly diminished. However, the quality of roads, especially in the mountains of Romania and Poland is very poor and the asphalt cover of roads has strongly been damaged.

The assessment of the real demand for mountain side-roads (including future demands as well) should carefully consider the local environment with special regard to meeting the requirements of environmental sustainability.

Under similar physical surface and population density conditions:

- A denser and better quality road network is needed in areas exposed to big tourist traffic but the impacts of its higher environmental load should also be foreseen (including the building of a bicycle road network which is considered as an acceptable infrastructure for ecotourism. Strict limitations should be applied regarding cross-motorcycling and quad cycling heavily damaging forest plants and soil (accelerating the erosion process as well). These crazy fashion activities generating big noise, disturbing and scaring away wild animals and tourists searching for peace and quietness are unfriendly for nature should be permitted only at certain places.
- Motorcycles should be banned from tourist paths and walkways, traffic should be limited on one-lane roads truck in time for some hours' period only (just to ensure the provision of local shops with the essential goods for tourists and the locals).
- Car traffic and road usage should be minimized in the territory valuable for the ecosystem and in still existing ('untouched') wild forests.
- The still operating mini railways in forests should be preserved because its passengers enjoying the beauties of nature are the less harmful for the environment. In places where tourists have great affinity for exploring the nature in such a way and relatively small groundwork is needed for the building of a narrow-gauge railway line the establishment of further forest mini-train services seems advisable. For exploring those parts of national parks that are open to the public, battery powered electrical mini- and middle-size buses (operated by light sulphur/sodium batteries) are the most suitable means of transport.

9.3.2 Regional traffic

The transport policy objectives in building connections between provincial cities and in urban agglomerations should be the preservation of the present role of railway services or at least halting its radically dropping tendency. (The use of small – even one carriage – trains with scheduled e.g. hourly, two hourly services is recommended in simplified mode reducing the costs far below the original level.) Bus services in areas with low passenger traffic should be reorganised by introducing flexible, demand-oriented bus service with call-centre based mini-buses or bigger share of taxis following the example of the system implemented in the (Italian) Apennines. In short-distance cargo delivery the use of railway can be profitable in exceptional cases only (e.g. the delivery of bulked mining products into power plants) in other cases cargo transportation by trucks and lorries has more reality. At certain places rafts and small ships may be used as alternative means of timber transportation. (For example national transport concepts are mentioning Upper-Tisza, Hernád and also the lower sections of Vah and Hron rivers as such potential places).

9.3.3 Interregional traffic

In domestic passenger transport between regional centres the use of fast, modern and comfortable IC train services should get a priority. Cargo can be delivered by fast light trains. For a faster access of cities dual carriageways or motorways should be built and air taxi services should be launched.

9.3.4 International (cross-border) traffic

The international traffic in the majority of countries in the Carpathian region is oriented from mountain top areas towards ‘mountain slope’ zones or the inside of the Carpathian Basin (Budapest) or further towards West-Europe.

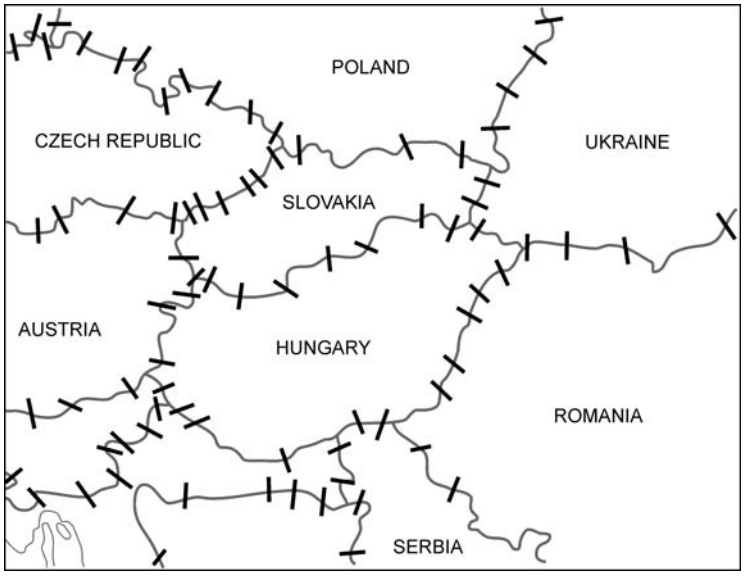
- A major traffic route is oriented from Transylvania but to certain extent from the Regat towards Hungary and Austria/Italy.
- One-third of Slovakia’s international traffic is oriented towards Hungary/Adriatic region.
- Two-third of the traffic of Carpathians-Ukraine is oriented towards Hungary/Austria.
- Almost 75% of North-Serbia’s international traffic is oriented towards Hungary/Western-Europe;
  - or targeted at the Czech Republic/Germany (almost 66% of Slovakia’s international traffic is oriented at the same direction).

  - A smaller part of the Carpathian region's international traffic is oriented towards north and north-east.
- To Moldova/Dobrogea, Moldavia and to Ukraine (and partially to East-Poland and the Baltic states through Ukraine).
- Between Slovakia and Poland bidirectional traffic is smaller, however transit traffic has a larger role (this latter is between the Vah Valley and Silesia (through the Jablonka Pass) or in the eastern part of the Carpathian region the most typical route of north-, north-eastern traffic flow is (Oradea–Debrecen)–Košice–Krosno/Nowy Sacz.
- Compared to the previous west-originated multi-component traffic flow system the bidirectional or multi-directional traffic within the Carpathians is very low:
  - Between Slovakia and Carpathians-Ukraine and even more,
  - Between Carpathians-Ukraine and Romania.

Figure 6–7 show that the number of railway border crossings and the number of road border stations between the above-mentioned countries is very low but even between Slovakia and Poland is far below than between Slovakia and Hungary and between Romania and Hungary.

Figure 6

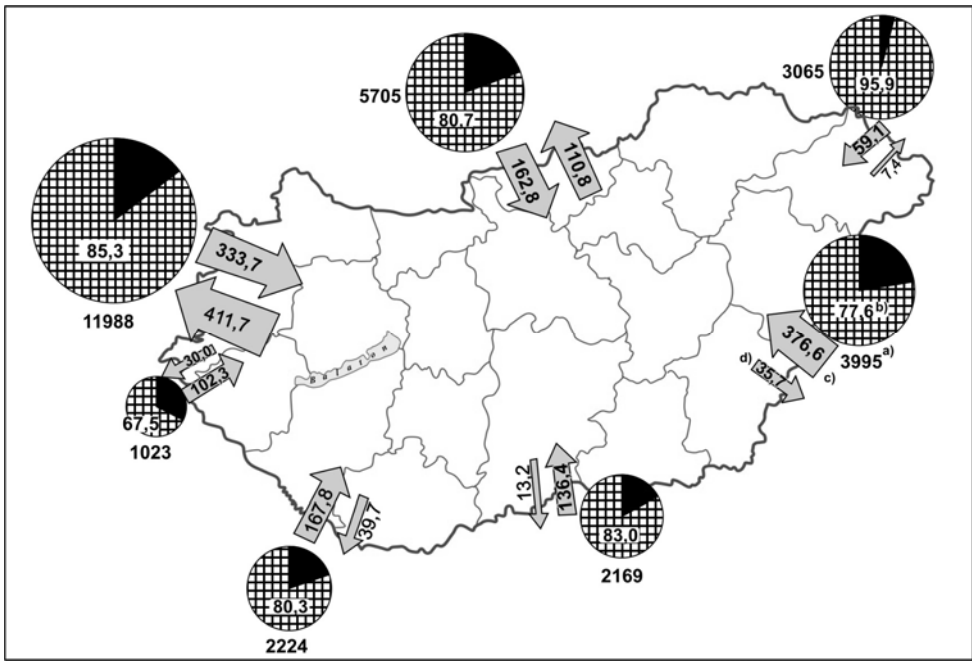
Railway lines passing the country borders of the Carpathian region (2004)



Source: Author's composition.

Figure 7

Cross-border car traffic through Hungary (2004)



Legend: Find at the Hungarian–Romanian border: a) in thousand; b) percentage of passengers' cars; c) no. of entering foreign lorries, in thousand; d) exiting Hungarian lorries, in thousand.
Source: Author's composition.

Considering the intensity and the structural features of international traffic and the cities of the Carpathian region:

- Should be connected with a greater number of directions and with higher intensity into the system of international rail services (Eurocity, Euronight, IC and express trains).
- Air connection should be established with a wider circle of cities.
- A carefully planned complex system of high-speed roads should be planned consisting of dual carriageways and motorways oriented towards directions not disturbing seriously any country's national interests.

In our time international motorway building plans are prepared on the basis of random ideas representing a certain business group's partial interests in the media (such as the Odessa–Chişinău–Iaşi–Satu Mare–Oradea–East Great Plain motorway) and these plans do not fit neither the Helsinki corridor concept nor the long-term national transportation concepts.

10 Border crossing in the Carpathian area

State borders are „scars" on the cheeks of the Earth. They are obstacles for spatial movement of commodities, services, people, ideas and information. Therefore, compared to other regions border regions are – usually – in disadvantageous situation. Borders always represent a kind of division, but this dividedness can be of very different scale. Some borders are very easy to cross, some others represent a very serious obstacle of movement. This dividing role depends on:

- the number, type, capacity, distance and spatial distribution of border crossings;
- the frequency of cross-border public transport (trains, buses, ships);
- the length and nature of administrative border-crossing procedures (Passport control and customs).

The Carpathian region is one of the European areas with the densest network of state borders. It is a continental area, with relatively small states and long land borders. The length of borders in the region is nearly 5,000 km. In addition, these borders belonged to the most guarded borders of Europe during the former "socialist" period. A small part of them (the border of Austria to Czechoslovakia and Hungary) was part of the Iron Curtain, but other borders – especially the borders to the former Soviet Union – were not less strictly guarded. The number of border crossings between the individual regions was not more than 2–3. Permission, to cross the borders was a rare privilege for ordinary people.

The situation changed substantially after the change of the political and economic system in 1989–1991. Gradually, more and more border-crossings were opened, the administrative procedures of crossing the borderwere substantially simplified and accelerated. Nevertheless, on some borders the number and density of border crossings is still insufficient, and crossing the border still takes a long time.

The *table 18* below show the border-crossing situation on the borders in the Carpathian region.

There are 147 road border crossings in the Carpathian region. However, only 55 – one third – out of the 147 can be used for border crossing without any limitations. Some are open only for passenger traffic, or even only for citizens of the two neighbouring countries. Others are not crossbar for buses. Some are not crossbar in the evening and at night. Some border-crossings – not listed in the table – are open only on special holidays. Considering these restrictions and limitations, the density of border crossings on some borders is still very low, the average distance between them is 150–180 km and there are only 2–6 crossings on long borders. (Only as a reminder: the borders of France, after the Schengen agreement can be crossed on 4,000 places!)

Table 18

Road border-crossings (2005)

Border section	Length of the border (km)	Number of road border crossings	Average distance between border crossings, (km)	International crossings without any limitations	Their average distance	Crossings only for passenger traffic (also buses)	Crossings only for passenger traffic (no buses)	Crossings only for citizens of the neighbouring countries	Crossings with limited opening hours
Poland–Slovakia	541	16	34	3	180	8	7	7	–
Poland–Czech Republic	770	28	28	10	77	11	7	2	2
Czech Republic–Slovakia	252	16	16	6	42	n/a	1	–	–
Slovakia–Hungary	677	16	42	7	96	2	2	n/a	6
Slovakia–Austria	91	4	22	2	44	1	–	–	2
Slovakia–Ukraine	97	2	49	1	97	–	–	–	–
Hungary–Ukraine	103	5	21	2	52	3	n/a	2	2
Hungary–Romania	443	10	44	3	147	5	–	2	1
Czech Republic–Austria	466	16	34	7	67	–	–	–	9
Hungary–Austria	366	12	31	6	62	5	n/a	2	7
Romania–Ukraine	531	9	59	3	177	–	–	–	–
Romania–Serbia	476	8	60	3	159	4	4	4	n/a
Hungary–Serbia	151	5	30	2	75	3	n/a	2	2
Total	4,964	147	34	55	90	42	21	21	31

Source: Author's construction.

The situation is not better in the case of railway border-crossings either (*Table 19*).

The number of railway border crossings is 64 in the region. But again, only one third (22) can be regarded as "normal" international border crossings. In 19, there are only one or two 3 train pairs per day (there are crossings where the frequency is one train pair per week!). There are crossings that are limited only to passenger traffic, or to freight transport. Finally, there are 19 crossings that are closed for the time being: there is no traffic at all. The average distance between "all service" rail border crossings in the region is 226 km, but there are border sections, where this average distance is more than 500 km!

This situation is hardly understandable, because even the present poor infrastructure would allow the establishment of more crossings without any significant investment. 100 years ago borders were different, regions that are now divided by a border, constituted single economic regions with relatively dense road and railway networks. According to the estimations, about half of those roads and railway lines that were constructed before World War I. and cross actual borders now are not used for border crossing. Many of them were fully dismantled, others are closed for traffic. No doubt, economic relations between the regions, now on the two sides of the border became less intensive and therefore the operation of trains became uneconomical. Railway lines were dismantled also inside the countries. But the accession of most Carpathian countries to the EU will certainly enhance economic relations and some of the old border-crossing lines could be reconstructed

Table 19

Rail border-crossings (2005)

Border section	Length of the border (km)	Number of rail border crossings	Average distance between border crossings, (km)	International crossings with more than two train pairs per day	Their average distance	Low (less than 3) trains per day	No passenger traffic	No freight transport	Closed lines
Poland–Slovakia	541	3	180	1	541	1	1	n/a	0
Poland–Czech Republic	770	5	154	1	770	1	3	n/a	8
Czech Republic–Slovakia	252	7	36	6	42	1	n/a	3	0
Slovakia–Hungary	677	9	75	3	226	4	2	n/a	0
Slovakia–Austria	91	3	30	2	46	n/a	n/a	n/a	1
Slovakia–Ukraine	97	2	49	1	97	n/a	1	n/a	n/a
Hungary–Ukraine	103	2	52	1	103	n/a	1	n/a	0
Hungary–Romania	443	7	63	1	443	4	n/a	n/a	2
Czech Republic–Austria	466	5	93	2	233	2	n/a	n/a	1
Hungary–Austria	366	7	52	1	366	3	n/a	n/a	1
Romania–Ukraine	531	5	106	1	531	1	2	n/a	1
Romania–Serbia	476	7	68	1	476	1	n/a	n/a	5
Hungary–Serbia	151	2	76	1	151	1	n/a	n/a	n/a
Total	4964	64	78	22	226	19	10	3	19

Source: Author's composition.

11 The general economic position of the Carpathian region

11.1 Historical background, current processes

The expansion of the European Union in 2004 and in 2007 made possible the accession of the eastern periphery to the European economic space. The economic shortfall of these countries is a result of more than a hundred year's backwardness.

a) The industrial revolution here was taken place later and it was caracterised by a lower intensity of industrialization than in the core areas of the present European Union. The shortfall of industrial development reduced the growth of commerce and services as well, partly because the industrial sector creates demand for itself and partly because of the slower growth of residential incomes. The flexibility of incomes is a specific feature of the tertiary sector which can dynamically grow if the volume of residential income growth is sufficient for changing the structure of consumption. Within this new economic structure the role of agricultural sector was decreasing at a slower speed and it has still a higher role in European comparison than it could be accounted for its more favourable conditions.
b) From the viewpoint of settlement development the late effects of urbanisation both in quantitative (the increasing number of urban citizens) and qualitative (the increasing role of urban lifestyle and infrastructure and functioning as employment and economic centre) aspects are direct outcomes of the above-mentioned process.
c) Following World War II the socialist regime, by implementing the two-sector economic growth model (favouring the manufacturing of production instruments against consumer goods for 'closing-up' purposes) further increased the area's economic backwardness. This kind of heavy industry dominated the industrialization based on mass-scale production plants that produced weaker net growth and continuously contributed to the quickly increasing structural problems in the economy; the depression in mostly mono-cultural heavy industrial zones and the need for restructuring following the raw material crisis at the end of the 1970s. This sector was a determinant element of the economy and its crisis – with several other factors – resulted in a massive and serious (foreign) debt crisis in the 1980s over the whole region making the absence of development capital almost persistent (both for local communities and economic organisations).

The problems of the socialist development model had already become obvious by the late 1960s, as in economically advanced countries – chiefly in the USA –

some signs of a new world economy emerged (as it was described by the words of J. K. Galbraith ‘a new industrial state’), that has been purified through the resource and energy crisis in the early 1970s and ended up with economic globalization.

Since the 1960s, changing the world economy into a three-polar following the rising economy of Japan (European, Atlantic-American and Pacific-East Asian economies) – the intensive growth of world economy and consumer society were practically continuing the expansive, post-fordist economy of the interwar period with the wasteful utilization of (cheap) resources and energy pursuing the interests of high gross output values and output-oriented economic philosophy. This process (with some other world political and social factors) soon led to a resource and energy crisis in the early 1970s. The quick increase of prices changed the main trends in economy in a very short time: economic lobby groups and economic philosophy are apparently bound to value-added (net increase oriented) production cutting down resource and energy consumption per product. An increasing number of economic activities is getting free from geographical limitations of resource and energy production and from the physical determinations of locating their business sites. In the idea of consumer society an ’insider’ globalisation switches into a higher gear: by the transformation of its economic organisation system (breaking up the big fordist organisation into specific and smaller internal units, by outsourcing, sub-dividing product manufacturing systems into smaller parts and separating them geographically and reintegrating them at a later phase through logistics into an emerging new economic sector). By the rapid development of technology and personal skills the minimum level of the economy of scale is getting higher and higher (the minimum volume of production granting profitability for the manufacturing of a product or delivery of a service) and the horizontal scheme of production – the same production phase on geographically different locations, but manufactured within the same production system by the same method – is manifested in the spatial division of labour; logics of the consumer society is expanding, manufacturing generates demand. By satisfying and regenerating demands production will be continuously expanding to an increasing (or the total by its long-term perspectives) part of the world; the development of transport and communication provide infrastructure for this with cheaper and cheaper per unit costs; the increasing number of international organisations and institutions is either abolishing or unifying the barriers of their regulation. National economic policies are increasingly compelled to following forced paths and they are getting weaker as well: an ‘invisible hand of market’ rules over everything; competitiveness becomes a fundamental category (from European, national, regional, microregional, local aspects and also from corporate, sectoral and economic structure perspectives). Competitiveness as a concept is linked to development (besides growth it refers to qualitative changes in the living-space of

people), but the rationalization of its operation is mostly determined by growth only (the quantitative and qualitative improvement of manufactured products and delivered services).

At the time of the economic transition in the East-European countries in late 1980s and the early 1990s economic development policies were facing extraordinarily big challenges due to the following circumstances:

a) The transition to market economy was accompanied by the urgent demand of adaptation to a completely different environment of world economy;
b) There was an inappropriate development trend of economy based on depressing structure of obsolete industry and stagnating service sector;
c) There was a significant deficiency in domestic capital funds with high foreign debts.

The economic transition of the 1990s in Eastern Europe was simultaneous with the faster expansion of globalization (multinational) in Europe. As it is seen from the above-mentioned facts the major part of the new economy is necessarily based on foreign investment-based or restructured economic organizations. The expansion of multinational firms yielding their profits from their absolute price advantages (cheap products) in the first period of transition served as a basis for this new economy. East-Europe proved to be a good territory for this. The region has been preserving its advantages for attracting foreign direct investments. After the turn of millennium absolute price advantages gradually have been replaced by quality-price ratio (comparative advantages in a sense) and the majority of East-European countries are keeping pace with their European competitors. The new economic development model is primarily built on product export-oriented processing industry, its relation and cooperation system (both in market and development aspects) are determined by international networks.

All these have several major implications on the economic situation and position of the Carpathian region:

a) The economic performance of national economies primarily depends on the performance of multinational companies; their spatial expansion is following a hierarchical pattern, usually they are strengthening the earlier spatial structure, even if they were built int he framework of 'green field investment' projects (conditions of the site are generally favourable in areas with prospering economy in the past). From spatial structural viewpoint they are increasing spatial development differences and the backwardness of peripheral areas.
b) The majority of relations and interests having a vital role in the economy is selected by the system itself. Multinational firms are typically less embedded into their host country's or region's economy (the local environment of multinational firms plays a minor role in their economic activity and it is

limited to direct product manufacturing process only). Local embedment is mostly achieved through the building of local subcontractor networks, but these networks do not play a vital role in the overall activity of multinational firms as a whole unit. Currently, their multiplier effects are low for other actors of economy, such as SMEs, major organisations and major employers of the economic system. They have only a minor direct role in the renewal of the whole national economy, although they grant higher economic development ratio for their host countries than the average of the economically advanced countries (as regards the objectives of the EU they facilitate economic cohesion but this is not true for the regional level).

c) From the early 1980s the orientation of international economic relations of East-European countries gradually shifted towards the economically advanced countries of West-Europe. By the early 1990s the common foreign relations of post-communist countries dropped to a minimum level and they built concurrent cooperations with West-European countries. During the 1980s this process was generated mostly by the problems of domestic economy and the increasing national debts, but in the 1990s it was evidently facilitated by the expanding relations with European economic networks resulting from the inflow of multinational investments and their quick market-driven economic growth. All these are encouraged by the efforts for EU accession and by the preparation for the EU membership which means an adaptation to the patterns provided by EU-15 countries. As regards markets and production factors, multinational investors evaluated the countries of this region as homogenous. Strong competition started among East-European countries for attracting investors by using a comprehensive system of tax reduction, tax benefits which was a further step towards reducing intra-regional cooperation.
d) On the scale of national economies West-European orientation has serious impacts on cross-border cooperation as well. It can partially be explained by historical reasons: borders were functioning rather as separating 'borders' than open 'frontiers' connecting neighbourhoods with each others. Initiations usually got stuck just on the level of plans due to insufficient local competences or development resources. The Austrian-Hungarian border zone and some parts of the Czech-German and Polish-German border are the only exceptions of this rule as they were much more successful in building their cross-border relation systems.

Summarizing the facts above we can firmly declare that the economic processes and trends following the early 1990s have not favoured so far the rebuilding of economic relations and cooperations between the countries of the Carpathian and East-European Region. Although these countries are facing the same prob-

lems and have common interests they are still competing for better positions in linking themselves to the advanced countries of the Western world. For this reason cross-border cooperation among the countries of the Carpathian region is rather an issue of serious challenge. It might even be regarded as a pilot project as there are only very few 'best practices' in the field of European cross-border cooperation.

It seems quite evident that Carpathian countries do have common interests in such issues as managing environmental problems for example (the environmental rehabilitation and development of the Carpathians provides a fundamental solution for the flooding problems of rivers and inland waters in the southern plains of the Carpathian Basin). The identification of common interests in the concrete socio-economic issues of cross-border cooperation seems to be a far more challenging task.

11.2 The region's socio-economic position

In the development history of the European integration each accession period was followed by a more or less decreasing economic performance of the newly joined territories (the average GDP per capita). The new accessions in 2004 and 2007 (which can be regarded as two phases of the same accession period) had such great impacts – together with the special features of the new member states – that may influence the European Union's regional policy as a whole.

The territory and the population of the European Union has significantly increased with the entry of countries with weak economic and employment performance and the 'statistical phenomenon' has been set up: the average GDP (PPS) per capita in the EU, and the 75% threshold limit for the classification of convergence regions would have been set so low that several NUTS2 territorial units would have surpassed the eligibility criteria of subsidization. For these more than 10 regions the EU (following the earlier scheme and practice of phasing-out) has introduced the phasing-in model. From the Carpathian region Central-Hungary with Budapest as regional centre belongs to this model (The Bratislava NUTS2-NUTS3 region has already been headed under this chapter for competitiveness purposes) (*Figure 8*).

The general underdevelopment of the whole group of the new members had further impacts as well.

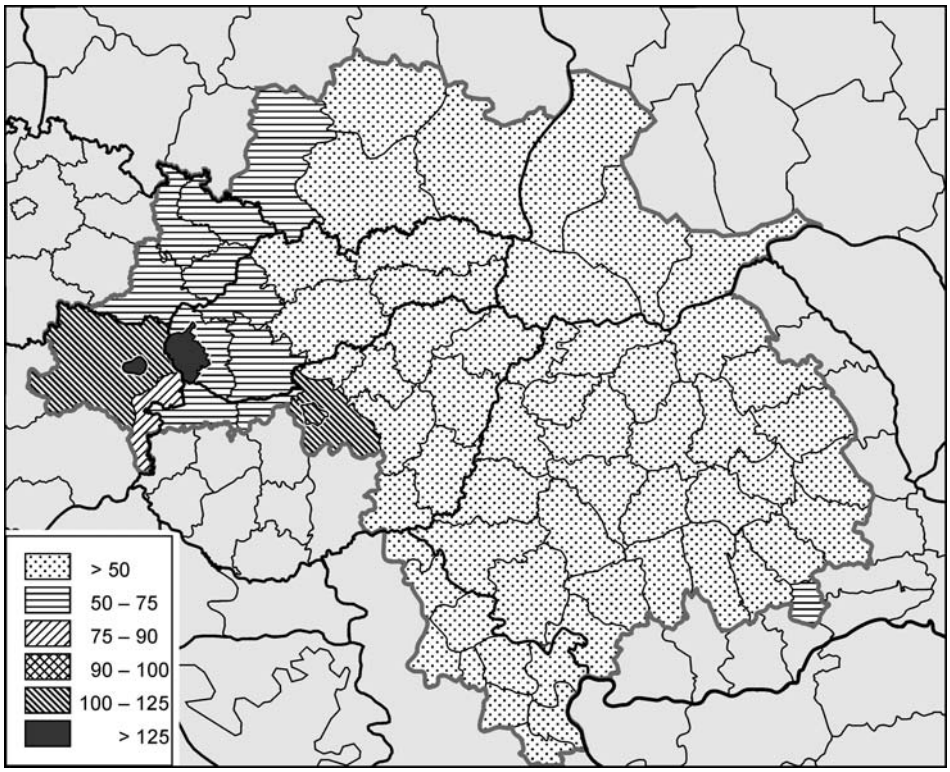
The economic backwardness of the new East-European members can be illustrated by the following fact. Their lagging behind of the EU-15 average on individual state level is on the same scale of a convergence problem as the development differences between the new member states' regions, since these are generally smaller than the regional differences within the advanced EU member states

(*Figure 9*). According to the preliminary statistical data of the year 2006 the difference between the two extreme values of GDP per capita (Luxemburg and Bulgaria) was sevenfold.

In this case, besides the convergence of the Carpathian new member states towards the EU standards the convergence of the Carpathian region as a whole is a part of a more comprehensive spatial problem. The best chances of economic development may be offered by decentralised regional programmes and the region could best benefit from its special geographic features – besides the implementation of environmental programmes and the intensification of cross-border cooperation as a part of socio-economic development project – in such a way.

Figure 8

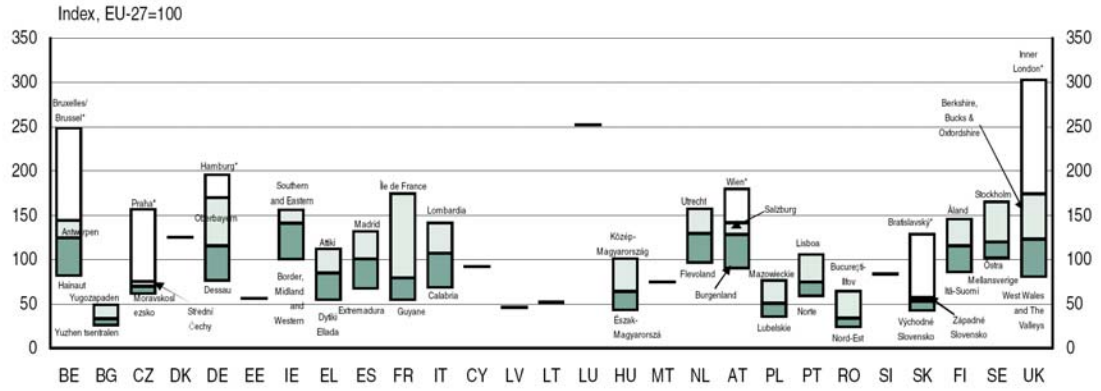
GDP per head (PPS, EU27=100) in 2004



Source: On the base of 1.2 Map in 4th Cohesion Report of EU, p. 8 and national statistical yearbooks.

Figure 9

GDP per head (PPS) by country and regional extremes (2004)



* In these regions, the GDP per head figure tends to be overestimated because of commuter flows.
Source: 4th Cohesion Report of EU, p. 10.

Both in the European Union and in the member states this decentralisation process has slowed down and the concept of achieving convergence through regional level development projects – i.e. the idea of the Europe of regions – has been suppressed for the time being.

Due to the EU's internal institutional problems and reforms, to the problems of the social macro-systems of member states (acquis communautaire), to the tasks of their transformation, to the slow progress of the Lisbon process and to the weaknesses of European competitiveness the EU's decentralised, regional-level development strategy was neglected. It was replaced – or rather supplemented – by a polycentric model of spatial development.

The new regional development scheme based on (big) cities and their environment and on the functional cooperation of urban networks is satisfying the demands of global development and of the changing spatial structure: today the satisfactory and at the same time attractive resources for foreign capital, good geographical location for transport connections and the easy accessibility of markets are the most essential factors of the site selection strategy in businesses: This scheme should follow the main stream of growth (export-oriented processing industry in medium or big-sized organisational units having close links to big multinational corporation systems).

The Carpathian region, particularly its highland territories, is rather unsuitable for meeting these criteria. Due to its geographical formation it has a lower than average population density, central cities are concentrating lower amount of resources, the physical accessibility of their gravity zones is limited or inappropriately shaped[1], the majority of their former industries – generally bulk manufacturing or heavy industry with their complementary light industry (based mostly on female labour force) – were terminated during at the introduction of market economy, and the majority of the regions has been excluded from foreign direct investments (and from privatization process) in general, therefore their industrial restructuring has not been accomplished yet. Instead of introducing business sectors that could guarantee an East-European style sustainable economic growth some small-scale manufacturing and service sectors have been introduced here. The region – particularly its highland zone – is much more suitable for the implementation of a rural style economic development programme. The rural development strategy is based on alternative, complementary and external territories and centres regarding employment, income-earning and partly public service functions. The impact of rural development initiatives is generally restricted to microregions and very rarely covers the whole territory of NUTS3 areas.

[1] The European Union's Third Cohesion Report among others provides details on the problems of regions with extreme geographical position. Within the Carpathian region only the territories of Slovakia are evaluated as areas with good physical accessibility.

During the delimitation of the borders of the Carpathian region with the inclusion of its lowland regions – being sometimes on the development level of the European Union – the programme was aware of and even took this aspect with its possible outcomes into consideration. However, we have no information what kind of economic-employment links these economically advanced satellite regions have built with highland territories. Practice has proved that even in countries having some traditions in the development strategy of decentralised regions very few horizontal-schemed inter-regional relations have been established. These relations have rather more of a vertical character cooperating with central state organisations (and very often this is the way how cross-border cooperation, but otherwise neighbourhood-like programmes 'de facto', are launched).

The limitations in gaining or enhancing decentralised regional-level competences for the territories of the Carpathian region originated not only from the EU's changed opinion on regions. Apart from Austria, the countries of the Carpathian region have long traditions in central state initiated and funded regional development policies. This is true even in case of Poland and Hungary where regionalisation was a 'living practice' even before the 1990s. The preparation for the EU accession and the regional development practice of the new EU states did not accelerate the process of decentralisation neither on NUTS2 nor on NUTS3 levels (local communities may be the only exceptions from this rule). Before the accession of the new members in the year 2004 no regional-level operation plans had been prepared, regional level development projects were initiated by central state authorities only (it was among others explained by the insufficiency of decentralised regional-level administrative management capacities for the planning and implementation of independent from the state regional development programmes).

The fact that after the economic restructuring of the 1990s the indicator of the former socialist countries presumably exceeded the EU's economic growth within an unchanged spatial structure and that politicians' concepts on economic reforms were reduced to 'tax competition' between the new EU members has another negative impact on the economic development of the Carpathian region and on the region's international and interregional cooperation system which is necessary for the expansion and enhancement of local-regional power and competences. These growth potentials can be utilised principally through the investments of multinational firms. The development of their subcontractor, small and medium-sized enterprises and their adaptation to the standards of European and global markets has a much inferior role in the economic growth process. As the creation of new jobs is getting more and more dependant on these elements, their productivity (GDP per employee): the most critical factor of cohesion is increasing at a slower pace than it would be necessary for the economic convergence.

As a summary, we can conclude that the economic convergence of the Carpathian region as a target should be achieved in a context of large underdeveloped regions with low productivity of their domestic economies. The Carpathian region's special geographical environment and historical background require a specific developement trends programmes which are different from the standard European and which can be implemented only in those cases where the heavy dominance of state gives way for the recognition and enforcement of regional interests and local-regional platform-based initiatives can be launched for the implementation of regional development programmes.

The EU's social cohesion objectives are targeted at the life quality of member states and spatial units. The population strategy was based on the idea of 'preserving and improving the acquis communautaire'. The formulation of objectives in such a more generalised framework can be reasoned by two basic factors:

a) The term 'life quality' itself has a complex meaning comprising such components as employment, income, age and professional skills of the population, health and expected lifetime. The chances of integration into socio-economic life, as well as its opposite, the socio-economic exclusion are also integral parts of the meaning of this term.
b) There are significant differences in the welfare systems of the different EU member states and development policies may also follow different strategies: total economic freedom was granted to interventions (subsidizations) even by the treaty of Rome for member states (it is excluded from the rules of competition regulation).[2]

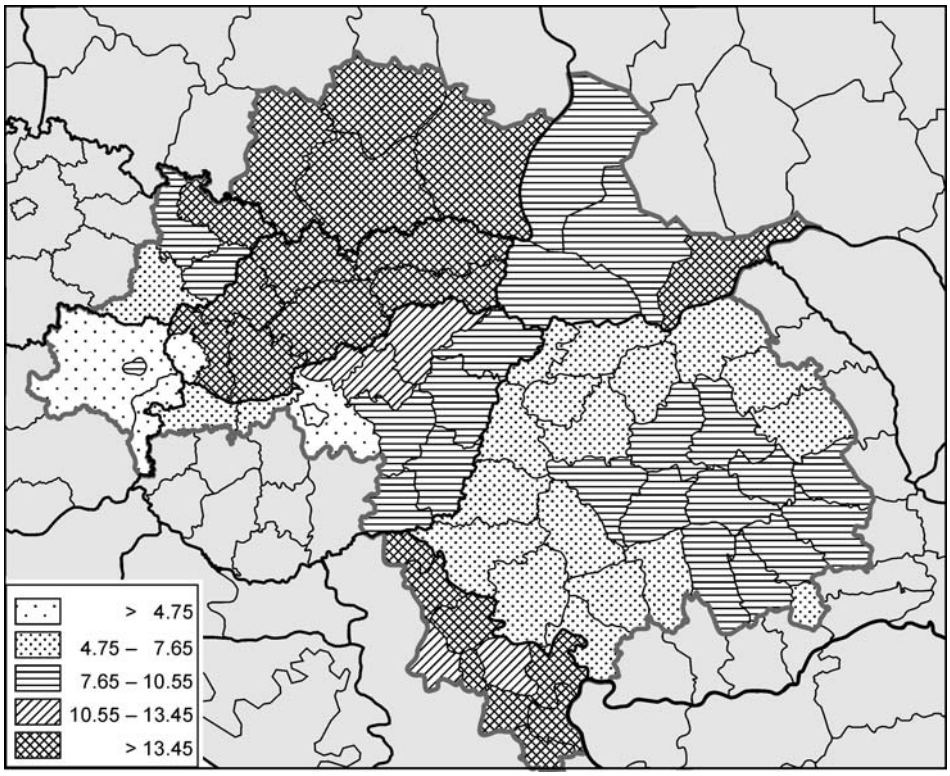
The general objectives of the EU's social cohesion policy comprise two priorities: the increase of employment (which serves as a basis for life quality) and combating socio-economic exclusion (which serves as a basis for granting equal chances for individuals). Indicators and indexes can be used only for the comparison of employment in case of the member states.

Both in the new EU member states and in the countries of the Carpathian region employment and unemployment – unlike in the cases of economic development and performance – have no special characteristic features and differing from the EU-15 (*Figure 10*). Although practically all the regions of Poland and Slovakia have the highest unemployment indicators in the EU, several regions in East-Germany, Southern-Italy, Southern-Spain or North-Finland are facing the same problem. The unemployment indicators of the other three new EU states and Austria are average or even better than the EU average.

[2] This difference is reflected by the fact that during the assessment of economic performance and development level GDP per head values are calculated on the basis of PPP (purchasing power parity); therefore nominal values should be modified by wage-price ratio.

Figure 10

Unemployment rates, % of labour force (2005)



Notice: EU27= 9.0%.
Source: On the base of 1.9 Map in 4th Cohesion Report of EU, p. 26 and national statistical yearbooks.

Different levels of economic development and performance are just like the unemployment 'heritages of the past' in a sense: with the economic transitions of the 1990s the population of the new member states was for the first time hit by unemployment in large scale; this was a serious shock for them. For this reason government policies in these countries were very sensitive for employment-unemployment issues. This made them set up large-scale employment instead of optimal-scale employment as the main objective of their employment policies.

Sustainable employment primarily depends on the improvement of economic performance and on the modernisation of the structure of economy. (This is true for all the actors of employment: for employees, sole traders or wage earners of any other employment category).

In many cases economic interventions of social type are unavoidable, but if growth and development capacities of the economy are left idle, i.e. the tasks of economic reforms and the modernisation of the economy (e.g. terminating the dual economy of multinational firms and domestic small and medium-sized enterprises in all the countries of the Carpathian region) are not accomplished it may lead to permanent contradictions between economic performance and employment positions, i.e. low economic productivity and performance.

The present development practice of lagging or rural areas tends to support local employment programmes (in NUTS3 or NUTS4 areas) albeit the evaluation of European trends shows that on the level of balanced and polycentric regions (NUTS2 areas) only an optimal-sized employment level can be regarded as appropriate. In case of the Carpathian region this means that for highland areas the economically much more advanced satellite regions will preserve their employment function for a long time.

11.3 The internal structure of the economic development and employment level of the Carpathian region

Before evaluating the internal circumstances of the Carpathian region some methodological remarks should be made. The weak points of any cross-country evaluations are the absence of reliable and comparable data which were based on a common database structure and content. Within the ESPON programme the final lesson of researches targeted at the structure of the European space and at the evaluation of the effect of development policies was that although a methodology was elaborated for cross-country researches, no common statistical systems are available for the applications (as within the member states it is available the method has a case study character, i.e. it is a comparison of country-level researches or a comparison of country reports, tailored to the potentials of the given country).

For cross-country researches no common research programmes have been elaborated (even within the EU-15 countries) which could be implemented within the territory of a member state.[3]

Eurostat has a statistical system which is limited to some basic indicators (territory, population, age-grouped population structure, GDP, GDP-PPS, unemployment rate) and it is used on a regular basis. Paradoxically, in methodological sense, the most frequently used statistical data, the GDP-PPS, among others due to the currency rate calculation of the domestic currency of countries falling out

[3] Sometimes research task is nothing more than selecting the most suitable data from the different ones from different resources for a specific phenomenon.

of the euro-zone is not free of errors. The fact that the EU's 3rd Cohesion Report is devoting nearly one page to methodical remarks of this and similar phenomena also refers to the existence of problems in research methodology.

The complexity of this problem is even higher in case of the Carpathian region. In the majority of the new EU member states regional policy and regional development were pushed into the background with only a limited amount of statistical categories. The adaptation to the statistical system of the Eurostat is slow. And there are still many other problems to combat: the system and registration of enterprises varies by countries and the comparison of relevant statistical data (e.g. economic structure, the distribution of economic sectors) requires great care with taking the methodological comments and comparison methods of the relevant statistical information into account.

Another problem is that the territory of the Carpathian region covers such countries as Serbia and Ukraine where very limited statistical information is available on territorial units and both the methodology of collection and the exact content of these data are unknown.

Even if a standardized series of statistical data has been collected the majority of problems is still not eliminated. In our case let us see the NUTS3 and NUTS2 level data of unemployment. In the Carpathian region the relevant statistical resources indicate missing data in two Austrian and two Romanian NUTS3 areas (commented as 'unreliable or uncertain data'). Even if we can find some data sometimes we should be suspicious of their validity. It is hard to accept the 9.1% unemployment rate of Vienna if the same indicators of all the surrounding Austrian regions show by far lower figures. We also should think that the very high unemployment rates of Slovakia have resulted from their data collection method which is different from the EU's standard.

As it comes from the above-mentioned facts – on the basis of the detailed data of the Carpathian region's NUTS3 and NUTS2 units and their dispersion values – the internal economic development of the Carpathian region and the region's spatial structure of unemployment can be characterised by five general factors or tendencies as follows:

a) The development level of the NUTS3 and NUTS2 units in the Carpathian region on the basis of GDP per head (PPS) with the unemployment indicators are primarily depending on their own country's general economic-employment indicators. Local features based on the territorial unit's geographical or landscape dependent delimitation have secondary impacts on them.
b) Geographical and landscape level impacts are principally manifested by the fact that the majority of the Carpathian region consists of NUTS3 and NUTS2 units situated in peripheral border zones. The economically ad-

vanced foreground areas lying off the border are the only exceptions from this rule. In highland border-zone territories practically no areas can be found which could get into the 'phasing out' development stage in optimal case. This chance is available only for some Czech and Hungarian territories beyond those Austrian, Hungarian and Slovakian territories which have already exceeded the 75% GDP per capita threshold value of phasing out. (In Austria Burgenland is a phasing-out region since the beginning of the current programming period while the development indices of Lower-Austria and Vienna exceeded the EU's average development level for a longer period. Central Hungary with Budapest as regional centre is a phasing-out region since the new programming period beginning by the year 2007 while the development index of Budapest, Hungary's capital city is 131.3%. In Slovakia the Bratislava region had a 129% development index of the EU average in the year of Slovakia's EU accession). Beyond the above-mentioned regions in Poland the NUTS3 territory of Cracow (in the year 2004 the area's GDP (PPS) per capita value was nearly 79% of the EU average) and in Romania the Bucharest region (67.1%) can be mentioned as regions with outstanding economic development. The GDP per capita indexes of the majority of the Carpathian region's NUTS2 and NUTS3 units are about half of the EU's average while in Romania several NUTS2 and NUTS3 units produce only 30% economic development indices of the EU average (*Table 20* and *21*).

Table 20

GDP per capita (PPS) in percentage of the EU25 average in Carpathian region (2004)

Name	GDP per capita (PPS) in percentage of the EU25 average						
	Country in EU25 average	NUTS2 maximum	NUTS2 minimum	NUTS2 difference	NUTS3 maximum	NUTS3 minimum	NUTS3 difference
Austria	128.7	179.7	89.8	89.9	179.7	67.9	111.8
Czech Republic	75.2	67.4	59.8	7.6	69.7	59.8	9.9
Hungary	64.0	101.6	41.9	59.7	131.3	34.6	96.7
Poland	50.7	57.0	35.4	21.6	78.7	29.5	49.2
Romania	34.0	64.5	23.6	40.9	67.1	22.9	44.2
Slovenia	56.7	129.3	42.3	87.0	129.3	34.4	94.9
Serbia	n/a	n/a	n/a	–	n/a	n/a	–
Ukraine	n/a	n/a	n/a	–	n/a	n/a	–

Source: Eurostat (calculations by authors).

Table 21

GDP per capita in euro in Carpathian region (2004)

Name	GDP per capita in euro								
	Country average	NUTS2 maximum	NUTS2 minimum	NUTS2 max/min, %	NUTS3 maximum	NUTS3 maximum (without capital city NUTS3)	NUTS3 minimum	NUTS3 max/min, %	NUTS3 max/min without capital city, %
Austria	31,019	40,281	20,129	200.1	40,281	32,518	15,233	264.4	213.5
Czech Republic	8,544	7,652	6,792	112.7	7,920	7,920	6,791	116.6	116.6
Hungary	8,143	12,931	5,331	242.6	16,718	9,413	4,409	379.2	213.5
Poland	5,342	6,004	3,730	161.0	8,283	8,283	3,111	266.2	266.2
Romania	2,806	5,328	1,949	273.4	5,544	3,894	1,890	293.3	206.0
Slovenia	6,292	14,342	4,696	305.4	14,342	6,456	3,817	375.7	169.1
Serbia	2,643	n/a	n/a	–	n/a	n/a	n/a	–	–
Ukraine	1,467*	1,082*	728*	148.6	n/a	n/a	n/a	–	–

* Date of Statistical Office of Ukraine; territorial units: oblast; 2005.
Source: Eurostat (calculations by authors).

c) As the above listing shows, in countries of smaller territory or population the regions are more advanced economically while the spatial units of Poland, Slovakia, Ukraine and Romania (with their host countries occupying the major part of the Carpathian region are on a lower level of development stage and in some areas are seriously backwarded. In case of Ukraine it should be remarked, however, that the country's GDP per capita indicator was unavailable, but in the currency of euro only, therefore the above-mentioned statement can be verified only by the literature of the Ukrainian spatial structure. The availability of spatial economic data is similarly poor in case of Serbia, but its spatial units belonging to the Carpathian region are economically more advanced in general than the average development level of their domestic economy.
d) Both the GDP per head and unemployment rate values are verifying the fact – taken into account during the delimitation of the Carpathian region – that a strong core-periphery relationship has evolved between the region's lowland and highland territories (*Table 22*).
e) And finally the spatial units of the Carpathian region follow the standard spatial formation of the west-eastward development slope. In Europe this means that moving off the so-called European growth (competitivness) pentagon the level of economic development is gradually decreasing in a linear way. It is not only the physical distance that rules this process, but also the European history of economic development and the present-day 'invisible hand of the market'.

In the Carpathian region, by progressing eastward from the west the development level of spatial units gradually decreases, prooved by the in a decreasing development level of national economic environment. The continuous reference to national economic environment has impacts on the region's socio-economic development chances as well: the success of international (cross-border) cooperation depends on the fact whether cooperation projects and programmes can be integrated into the national development plans of the Carpathian countries. It does not seem that the Carpathians as a mountain chair would represent any particular interests concerning the socio-economic development of its countries. Its special interests are rather bound to the protection (rehabilitation) of its natural heritage.

Table 22

Unemployment rate (15 years and over) in Carpathian region (2005)

Name	Unemployment rate (15 years and over)						
	Country average	NUTS2 maximum	NUTS2 minimum	NUTS2 max/min, %	NUTS3 maximum	NUTS3 minimum	NUTS3 max/min, %
Austria[a)]	5.2	9.1	4.3	212	9.1	3.3	276
Czech Republic	7.9	13.9	7.7	181	13.9	8.1	172
Hungary	7.2	10.6	5.1	208	12.0	4.3	279
Poland	17.7	19.0	15.2	125	21.5	14.2	151
Romania[a)]	7.2	9.2	5.7	161	15.1	4.2	360
Slovenia	16.3	23.1	5.3	436	24.7	5.3	466
Serbia	20.8	n/a	n/a	–	n/a	n/a	–
Ukraine	6.7[b)]	9.8[c)]	7.0[c)]	140	n/a	n/a	–

[a)] 2 NUTS3 units have no relevant data.
[b)] ILO estimation.
[c)] Date of Statistical Office of Ukraine; territorial units: oblast.
Source: Eurostat (calculations by authors).

12 Industry in the Carpathian area

12.1 Industrial typology of the Carpathian regions

Central European space examined in the scope of research demonstrates a high degree of heterogeneity in all respects; industry being one factor among several. As elsewhere, development gradients apply, showing a shift from more advanced activities concentrated in regions closer to the core of Central Europe (the Czech Republic, Austria and Southern Germany), and less advanced ones in the eastern border areas. The predominant gradient progresses from west to east, going in a southwest-northeast direction in Poland, and in a northwest-southeast one from Hungary to Romania and Serbia. Added to this is differentiation along the urban dimension, with metropolitan (capital) regions benefiting from agglomeration economies, as well as a high concentration of know-how, R&D activities and advanced financial services. Except for the Katowice conurbation in Upper Silesia and Kraków in Lower Poland, all of these double as capital regions. The next level of the urban network, the large cities, which are regional centres, they are in turn followed by small towns, the most typical non-rural settlement type in under-urbanised Central Europe. Generally, an industrial typology can be constructed along these two axes (*Table 23*).

Highly urbanised core regions have undergone significant tertiarisation since the transition. While a growing emphasis on the service economy is a global phenomenon, Central European post-socialist states experienced it at an accelerated rate during the transition from industry-oriented planned systems to market economies. Central regions were at the forefront of the change; while they were previously among the most significant industrial regions[4], the 1990s brought a rapid downsizing and the disappearance of large firms as business (among them financial) and consumer services replaced industry as the prime engines of growth. The main question regarding industry was the question of its heritage – i.e. brownfield redevelopment and combating unemployment. Nevertheless, while the concentration of industrial employment has declined or stagnated in metropolitan areas, they have been successful in keeping some of the most advanced sectors, especially in knowledge-intensive fields such as pharmaceuticals, electronics, optics and certain types of chemistry. The supporting R&D framework is another major advantage; public and private research institutions are overwhelm-

[4] In 1971, the territory of Central Hungary concentrated 40% of national industrial employment and 32% of investments. By 1991, this had changed to 29% and 30%, and by 2004 to 26% and 25%, respectively. In the same interval, Bucharest went from concentrating 18% of employment and 14% of investments to 13–11% in 1991 and to 13% of employment in 2004 (no data on investment concentration was available for that year).

ingly established in metropolitan areas, while it is much less common in regional centres and almost completely absent below this level. Slovakia and Hungary show the highest degree of concentration here, whereas Poland, the Czech Republic, Romania and Ukraine have their (relatively speaking) significant lower level of regional centres.

Table 23

Industrial typology in Central Europe

		Geographic gradient	
		Core	Peripheral
Urbanisation	Higher	Service economy with high value added industrial branches	Heavy industrial centres, old industrial regions
	Lower	Capital-intensive industry with a high FDI ratio and emerging networks	Labour-intensive small-town and rural industry

Source: Author's construction.

Core regions with a lower urbanisation level – usually on the western borders – benefited most from Foreign Direct Investment transfers. We can see this most clearly in the Austria–Slovakia–Hungary cross border area, which has become a recipient of machine industry investments. It is notable that unlike metropolitan core regions, these areas lacked autonomous research, development and control functions; their prime advantages being good accessibility, competitively priced yet well-qualified human resources and an already established industrial milieu. These advantages were fundamental in the first waves of capital inflow. With increasing labour costs, and the catching up or reindustrialisation of more eastern regions, their role had been gradually diminishing. *Domański* (2003) argues that there is presently a shift from 'costs' to 'markets': cost advantages are replaced by factors such as market access, the quality of local services, the availability of skilled workforce and so forth.

Yet these factors are in themselves insufficient to maintain the current growth dynamics. It has been argued (e.g. by *Turnock* 2001, *Csizmadia – Grosz* 2002, *Worrall – Donnelly – Morris* 2003, *Grosz – Rechnitzer* 2005) that local production systems and encouraging innovation are the long-term guarantees of retaining competitiveness. Supplier networks, industrial clusters and the institutional background encouraging their formation (industrial parks, incubation centres, etc.) were priorities for state industrial (and occasionally regional) policies, both to encourage the location of new industrial investments, and to increase the embeddedness of already existing capacities. In multiple cases (e.g. Western Trans-

danubia in Hungary), local and regional administration showed a better ability to manage these low-level systems than central intervention; in the federal state of Austria, regions already have the competences required for these tasks.

Old Industrial Regions generally take a *peripheral spatial position but have a high urbanisation level* due to development dating back to the 19th century or socialist industrialisation policy (planned cities such as Nowa Huta, Tiszaújváros or Ózd belong to this latter category). Here, transformation's consequences were often industrial depression as monofunctionality, the loss of markets and the inability to compel large-scale producers to downsize or close down. Urban centres with a strong chemical industrial base were more successful at weathering the crisis, while metallurgy suffered worse and military industry was even harder hit.

The causes of depression, and policy responses attempting regeneration, are close to Western European antecedents; the main differences were the extent of the problems (due in part to the delay in their mamagement) and the regional context. Monofunctional industrial structure often coincides with peripherality, as heavy industrial plants were preferentially located in low-developed regions as a policy instrument. With the decline of traditional sectors, these deficiencies were once more brought into light. Coal and steel regions like the Jiu valley, Borsod-Abaúj-Zemplén County or Košice in Eastern Slovakia are typical examples. Ukrainian regions, whose centres are large cities[5] surrounded by under-urbanised peripheral areas, showed these symptoms to an even greater extent, as their economies were linked to production systems supplying the entire Soviet Union.

Industrial regeneration led to mixed results. Growth based on traditional sectors has was most notable in Upper Silesia (where it is coupled with investments into machine, especially automotive industry, as well as advantages stemming from the US conurbation's metropolitan character), but also this is where companies could modernise their technology, invest in process innovation and possibly diversify into higher-end products. Alternative activities based on the local knowledge base also produced good results, and the presence of strong secondary and tertiary technical education had a positive influence (e.g. in Ostrava or Katowice). However, the main feature of industrial development in urbanised peripheral regions is still de-industrialisation, where services are incapable of replacing the economic role of industry. De-skilling, the loss of qualified human resources to low replacement and out-migration, precludes redevelopment and menaces with conserving the peripheral character of the areas under scrutiny. Similar phenomena are noticable in Borsod, Eastern Slovakia and several Romanian counties.

[5] Lviv has 860,000 inhabitants, Chernivtsi 242,000 and Ivano-Frankivsk 204,000. Uzhgorod, with 111,000 inhabitants, is the smallest of them, and is closer to the under-urbanised peripheral type.

The final industrial profile is found in *under-urbanised peripheral regions*. It may describe entire administrative units such as Transcarpathia, Ukraine, or encompass areas distant from regional centres. They have always been underdeveloped, located away from core areas and capital cities. Their industrialisation, typically in the second half of the 20th century, was a conscious decision on the part of development policy to modernise their economies. Since resources were scarce and the main social problem to be solved was unemployment, labour-intensive branches in light and food industries became the typical form of investment. These were created with modest capital expenditure, but they were able to soak up labour surplus. While most of industry in the Carpathian area is semi-peripheral in the world economy, these areas saw peripheral industrialisation even in the national context, carrying over to the post-transformation period.

Peripheral industry, located in small towns and large villages, has been showing continuing signs of stagnation. Undercapitalisation, fragmentation and market loss remain persistent problems (although the process is more gradual than the rapid collapse of heavy industry), while the local labour market also shows signs of weakness. However, it is possible to see a resurgence of light industry branches, notably textiles, on the eastern peripheries of Central Europe. Surviving companies have sometimes been successfully integrated into continental production networks; progressing from simple assembly to own brand and own design manufacturing. This trend is most strongly noticable in Ukraine and Eastern Slovakia; Poland's largest textile centre, Łódz, is outside the current study area. Peripheral regions had also been locations of subsidiaries and production sites for larger industrial companies in the past (Hungary and Poland pursued industrial deconcentration policies to this effect from the 1960s and onwards), but the majority of these have since folded or greatly reduced operations. Romania, Ukraine and Serbia show better survival rates, or more precisely attrition by gradual erosion instead of an initial transformation shock.

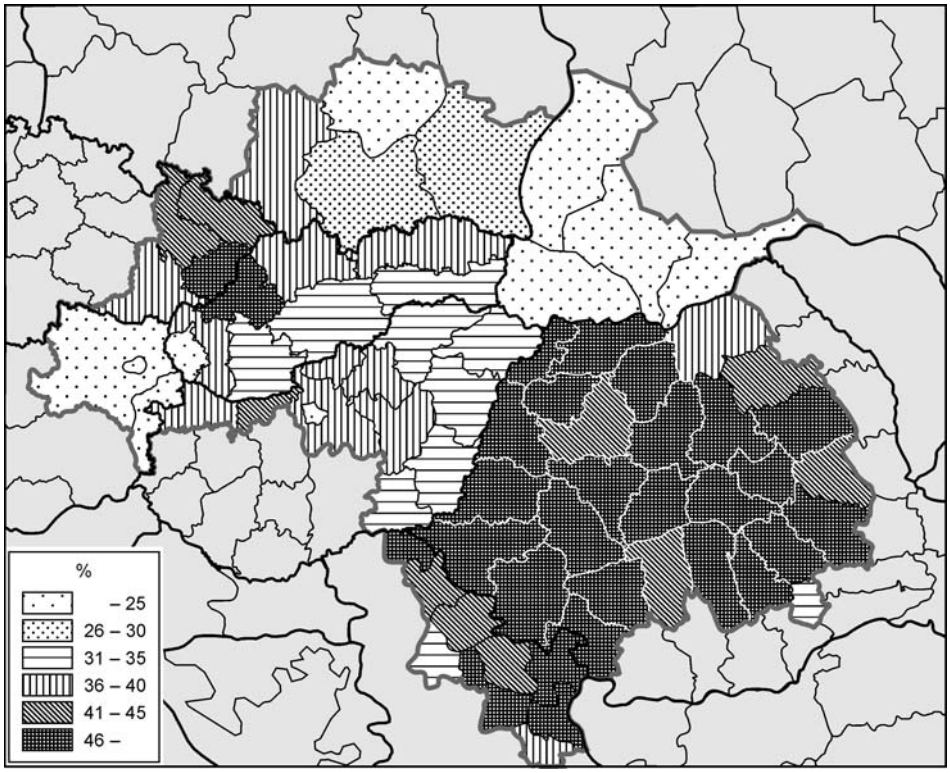
12.2 The changing spatial structure of industry in the Carpathian area

The role of industry in total employment shows a high level of variety in the study area, and is furthermore in contrast with the de-industrialisation process which Central Europe has undergone since transformation. As seen in *Figure 11*, Romanian counties could be considered to be the highest industrialised where employment was concerned, and the same figure would be lowest in national capitals and agrarian districts (c.f. the Hungarian Great Plains, Southern Slovakia and Poland's Świętokrzyski region). On the other hand, Romania also experienced the highest

level of de-industrialisation after 1990–1991.[6] Therefore, it is likely that a high proportion of the secondary sector in peripheral regions or districts reflects an absence of job opportunities in others. Old Industrial Regions are the opposite: here, the highly developed urban network provides a better base for tertiary development, and consequently, many of them are no longer leaders in their own countries.

Figure 11

Industrial employment, % of total (2004)



Source: National statistical yearbooks.
Ukraine – 2005.

[6] On the national level, the number of industrial employees in 2004 reached 100% of 1990–1991 figures in Slovakia, 94% in the Czech Republic, 67% in Poland, 64% in Hungary, 50% in Serbia and Montenegro, and last 48% in Romania.

Diverse industrial branches follow different patterns of distribution. Mining and quarrying, which has seen dramatic decline, is to be found in a few large concentrations (especially Upper Silesia, Gorj, Prahova and Dâmbovița) as high costs and shrinking demand made it uneconomical to preserve small capacities. Except Upper Silesia, mining areas are modestly urbanised and have a peripheral character.

Larger metallurgical units are located in the urban centres of Old Industrial Regions (Borsod-Abaúj-Zemplén County in Hungary, Eastern Slovakia, Moravian Silesia, Upper Silesia, Hunedoara and Reşița). All of them have experienced waves of downsizing (and in the case of Ózd and Miskolc in Hungary, close to complete dissolution), but those that remained are being integrated into global production networks and benefiting from increasing demand. In the case of smaller, scattered combines in Ukraine and Romania, this process has not yet been significant. Chemical industry's patterns are similar, but they, especially petrol chemistry, have been rather able to adapt themselves to market demands, and declined less.

As opposed to metallurgy, the distribution of machinery production has become more even; while the former became more concentrated because of closures, the latter was one of the primary targets of FDI transfers, leading to the growth of previously smaller community close to the western borders (e.g. Győr-Moson-Sopron, Komárom-Esztergom, Trnava and Trenčín). So far, continuities have been stronger than change. An examination of Central European location trends in the automotive industry (*Worrall – Donnelly – Morris,* 2003) proves that inherited capacities are still dominant; and even new investments are located in regions with a strong tradition in machine manufacturing.[7]

High value added and knowledge-intensive industries are almost purely metropolitan, although some manufacturing functions have been also located in under-urbanised core regions and, more recently, in Old Industrial Regions as well. In addition to agglomeration economies, the availability of a highly qualified workforce, R&D and advanced business services is crucial.

Textile and clothing (footwear etc.) industries are predominantly peripheral (a traditional branch of small towns) or to be found in Old Industrial Regions, where they were located to reduce hidden unemployment among women. Presently, rising labour costs are resulting in their decline in western regions, while restructured combines on eastern peripheries are, again, starting to grow. Finally, food industry's distribution can be considered even; naturally, its role is stronger in regions where other branches are weak or not present.

[7] Greenfield sites were in the 1000 to 4000 range, with regards to the employment greatly outstripped by Dacia in Pitești (21,000), Bielsko-Biała (14,500) and Tychy (7,200).

13 Agriculture in the Carpathian region

The territory of the Carpathian region comprises some parts of eight countries: Austria, the Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia and Ukraine. These countries have very different agro-ecological background, such as soil, physical surface, and regional climate offering a wide palette of agricultural farming activities. This paper is attempting to give an overview on the Carpathian nations' agricultural farming cultures evolved under the above-mentioned agro-ecological circumstances and it is also trying to reveal how these nations use agricultural farming for improving their living conditions.

First of all, I would like to point out the fact that within the countries of this region – with the only exception of Austria – agriculture has by far greater importance than in any other earlier member states that joined the European Union before 2004. The greater importance of agriculture is manifested by the higher ratio of agricultural lands of the total land territory, by the higher ratio of manpower employed in agriculture[8] and by the higher contribution of agriculture to the GDP than in the EU states. Nevertheless, the productivity of agriculture in this region is much lower than in the older states of the EU. This can be explained by several reasons: by the overall economic development level of the Carpathian region (*Figure 8*), by the lower subsidization of agricultural farming, by the poorer availability of capital resources etc.

13.1 The relationship between employment of active wage earners and agricultural farmers

In this region agriculture plays a kind of buffering role in employment as this sector can provide temporary jobs for the unemployed or if new jobs are created in industrial or service sector, they can be filled in by agricultural manpower.

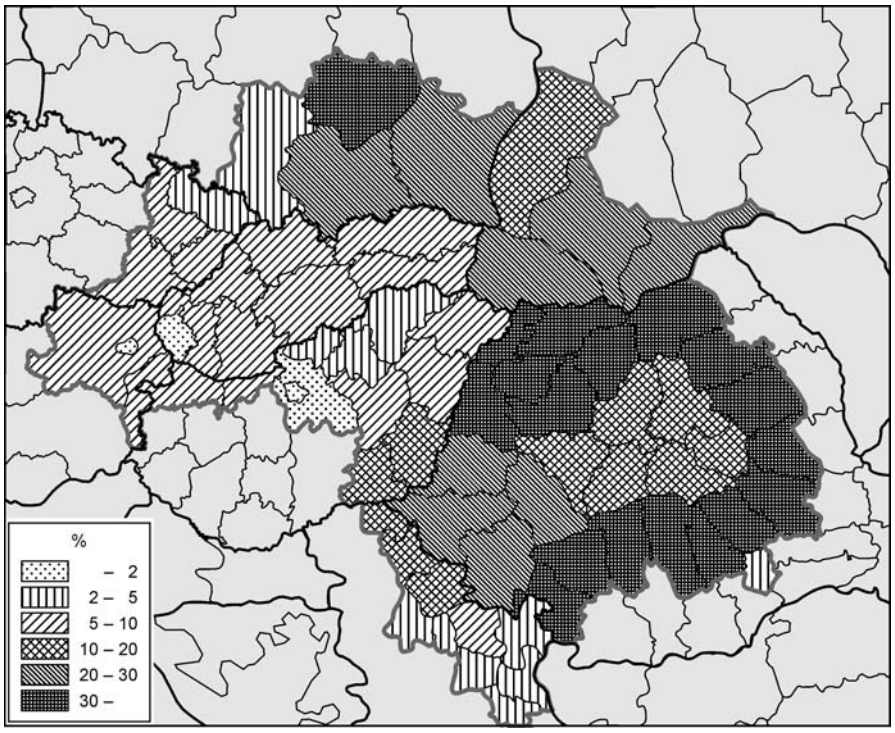
13.1.1 Austria

In Austria 5.7% of the total employed persons worked in the agricultural sector in 2002. Apart from the regions around Vienna the highest ratio of people employed in agriculture can be seen in Lower-Austria (*Figure 12*). In Burgerland, an underdeveloped region by Austrian standards, the ratio of agricultural employment is below national average (*Table 24*).

[8] By the term 'employed in agriculture' we mean people working in agricultural, forestry and fishery sectors.

Figure 12

The ratio of persons employed in agriculture in the Carpathian region, % of total (2004)



Source: Eurostat, national statistical yearbooks.

Table 24

The number and ratio of total employed persons and employed persons in agriculture in Austria (2004)

Regions	Total number of persons (1000 persons)	Employed persons		Persons employed in agriculture	
		1000 persons	%	1000 persons	%
1. Burgenland	277.4	122.4	66	6.5	5.3
2. Lower-Austria	1,563.2	702.0	67	61.8	8.8
3. Vienna	1,612.5	888.8	78	8.0	0.9
Österreich	8,173.3	4,139.0	74	235.9	5.7

Source: Eurostat.

13.1.2 Czech Republic

In the Czech Republic the 68% ratio of total employed persons is high but the 4% ratio of persons employed in agriculture is low which can be explained by the relatively high general level of the country's economy – within the Carpathian region.

In the Czech Republic a low ratio of total persons employed implies a low ratio of people employed in agriculture as well. The Czech example in the Carpathian region demonstrates that in Moravskoslezsko region with the lowest ratio of total employment has the lowest ratio of people employed in agriculture while Jihovýchod region has the highest ratio of total employment with also the highest ratio of people employed in agriculture (*Table 25*).

Comparing the Austrian and Czech figures from the point of view of total and agricultural employment we can conclude that the capital city in the Czech Republic is excluded from the Czech regions belonging to the Carpathian region. This makes the implication of higher general employment – higher agricultural employment coherence more spectacular. Thus, agriculture really has a kind of buffering role. This is largely relevant for the other countries of East Central Europe as well.

Table 25

The ratio of total employed persons and persons employed in agriculture in the Czech Republic (2004)

Regions	Total number of persons (1000 persons)	Employed persons		Persons employed in agriculture	
		1000 persons	%	1000 persons	%
1. Jihovýchod	1,640.2	774.1	67	49.3	6.4
2. Střední Morava	1,227.0	558.6	64	28.7	5.1
3. Moravskoslezsko	1,258.9	528.5	59	15.4	2.9
Česka Republika	10,216.0	4,930.5	68	196.3	4.0

Source: Eurostat.

13.1.3 Hungary

In 2004 in the ranking of the total employed people among the 25 members of the European Union Hungary (56%) was by far lagging behind the average of the EU taking the 23rd place only and was preceded even by Slovakia. The ratio of people employed in agriculture (5.1%) is low compared to the Carpathian region's average but there are extremely large differences in the ratio of agricultural employ-

ment among the Hungarian regions. The ratio of people employed in agriculture is the lowest in Central-Hungary (1.4%) and the highest in the Southern Great Plain region (10.8%) (*Table 26*).

Table 26

The ratio of total employed persons and persons employed in agriculture in Hungary (2004)

Regions	Total number of persons (1000 persons)	Employed persons		Persons employed in agriculture	
		1000 persons	%	1000 persons	%
1. Central-Hungary	2,835.5	1,304.1	66	18.0	1.4
2. Central-Transdanubia	1,111.9	420.5	54	21.1	5.0
3. West-Transdanubia	1,001.8	422.7	61	21.1	5.0
4. North-Hungary	1,275.6	396.3	46	17.3	4.4
5. Northern Great Plain	1,275.6	509.2	49	39.6	7.8
6. Southern Great Plain	1,357.6	484.7	52	52.3	10.8
Hungary	10,107.1	3,879.3	56	198.8	5.1

Source: Eurostat.

Regarding the ratio of total and agricultural employments Hungary is representing a special model. In the economically more advanced Transdanubian regions with higher ratio of employed people have lower ratio of people working in the agricultural sector than the national average. Nevertheless North-Hungary (*Figure 12*) the weakest region from the point of view of total employment has almost the lowest ratio of agricultural jobs. Nevertheless, the Great Plain – a region lagging behind Transdanubia – has the highest ratio of agricultural employment.

13.1.4 Poland

Poland has the lowest ratio of employment (48%) and a very high ratio (18%) of agricultural employment in the EU. In the Polish regions of the Carpathian region the ratio of employed persons – with the exception of Śląskie region – is slightly above the national average. However the ratio of people employed in agriculture is by far exceeding even the very high Polish average. This is explained by the fact that in Poland the collectivisation of agriculture has not been fully accomplished leaving traditional small-scale peasant farms in the south-eastern part of Poland. The older generation of active population did not emigrate from here

because they wanted to preserve old traditions. The middle-aged generation remained here because they could not find any other employment chances in agriculture (*Table 27*).

Regarding the ratio of total and agricultural employment Poland is somewhere close to the Czech model. A higher ratio of total employment implies higher ratio of people employed in agriculture in the Polish regions. Śląskie Region is a special exception from this rule as it is economically well-advanced under Polish circumstances, but among the Polish regions of the Carpathian region the employment ratio here is the lowest (*Figure 4*), and the ratio of people employed in agriculture is only one-third of the national average (*Figure 12*). This is explained by the fact that Śląskie is an urbanised and industrialised region, and the majority of agricultural lands is covered by forests requiring a lower amount of agricultural labour force.

Table 27

The ratio of total employed persons and persons employed in agriculture in Poland (2004)

Regions	Total number of persons (1000 persons)	Employed persons		Persons employed in agriculture	
		1000 persons	%	1000 persons	%
1. Małopolskie	3,256.6	1,097.6	49	245.2	22.3
2. Śląskie	4,709.9	1,568.1	46	98.4	6.3
3. Podkarpackie	2,707.9	694.5	49	207.6	29.9
4. Świętokrzyskie	1,290.1	445.3	50	149.2	33.5
Polska	38,182.2	12,906.9	48	2,314.1	17.9

Source: Eurostat.

13.1.5 Romania

No detailed statistical data have been published on Romania and on the aforementioned countries in the Romanian Statistical Yearbook titled Agriculture and Sylviculture. Unfortunately the Statistical Yearbook provides data on national level only saying that Romania has 21.6 million inhabitants. The employment ratio of the active wage earners is 61%. This means 9.2 million people in absolute figures. 2.9 million of them is employed in agriculture which is 32% of the total employment. Among the EU-27 states Romania has the highest ratio of agricultural jobs. This situation originates from the massive termination of urban jobs after the change of regime in 1990 and from the 'privatization' of the assets of cooperatives by a public initiative returning to a private farming system run be-

fore the collectivization of agriculture. This was a return to the old peasant farming system which was fostered by the Romanian re-privatization model as well. Former landowners could reclaim their land up to 10 hectares only and it was only 10 years after the change of regime when the Romanian laws allowed private persons to own 50 hectares of land.

The introduction of petty peasant properties increased the ratio of agricultural employment. However, this is the only East Central European, post-socialist country where foreigners are allowed to purchase land. Foreigners – mostly Italians – recently purchased large territories and if this tendency continues it will drastically decrease the number of agricultural jobs even in the near future.

13.1.6 Serbia

In March 2002, the governments of Yugoslavia and its two constituent parts, Serbia and Montenegro, agreed to replace the federal republic by a state to be called the Union of Serbia and Montenegro. Each republic would retain its own currency, tax and budgetary systems, customs services, banking systems and financial supervision, but the two republics would form a common market with free movement of people, goods, services and capital. The republics also agreed to harmonize their respective trade and customs policies by aligning them with the economic system of the EU.

Macroeconomic conditions are reviewed in the context of aggregate trends for the two Republics. Economic recovery began in 2000 with a 6–7 percent increase in real GDP. This growth continued in 2001, despite continued contraction within the industrial sector, because the agriculture and service sectors recovered strongly.

13.1.7 Slovakia

In Slovakia both the ratio of total employment (54%) and the ratio of people employed in agriculture (4.4%) are low. This general figure covers large differences between Bratislavský kraj – including Bratislava, the capital – and the other parts of the country. The larger is the distance of a region from the capital the lower employment ratio it has (*Figure 4*). By the regional indicators of agricultural employment the Slovak model is similar to the Hungarian one (*Figure 12*). In the central region including Bratislava the ratio of people employed in agriculture is low but in the less advanced East-Slovakian regions not only the employment ratio but also the ratio of people employed in agriculture is the lowest within the country (*Table 28*).

Table 28

The ratio of total employed persons and persons employed in agriculture in Slovakia (2004)

Regions	Total number of persons (1000 persons)	Employed persons		Persons employed in agriculture	
		1000 persons	%	1000 persons	%
1. Bratislavský kraj	600.4	382.9	86	6.1	1.6
2. Západné Slovensko	1,863.9	697.6	52	38.9	5.6
3. Stredné Slovensko	1,352.5	468.3	49	21.5	4.6
4. Východné Slovensko	1,565.6	586.9	47	23.4	4.6
Slovensko	5,382.4	2,055.7	54	89.9	4.4

Source: Eurostat.

13.1.8 Ukraine

Agrarian sector is an important branch of economy in Ukraine in a whole and particularly in its Carpathians region. According to the data of the State Statistics Committee of Ukraine, in 2005 almost 5 million people or 19.3% of total number of economically active population were involved into agricultural industry and subsidiary branches (hunting, forestry and fish production). In the Carpathians region oblasts this indicator is even higher than in Ukraine and fluctuates from 20.0% – in Ľviv oblast to 29.2% in Chernivtsi oblast.

In 2004 these branches contribution in gross domestic product of Ukraine amounted to 10.8%. In the Carpathian region it was even higher and amounted correspondingly to 13.8% in Ivano-Frankivsk, 14.4% – in Ľviv, 17.6% in Zakarpattia and 22.4% in Chernivtsi oblast (*Table 29*).

In the Carpathians region the ratio of people employed in agriculture is high like in Poland and Romania (*Figure 12*). The highest ratio of people employed in agriculture can be seen in Chernivtsi oblast.

13.1.9 Summary

As a general figure, the ratio of people employed in agriculture is 7.6% in those parts of the Carpathian region where we had available statistical data. In case of Romania we had national level data only and there the ratio of people employed in agriculture was 32%. If we had available data on Serbia and Ukraine they would further increase this general ratio. Thus, the role of agriculture in employ-

ment is very important in the Carpathian region but there are significant differences in the ratio of agricultural employment among the different regions of the Carpathians (*Figure 12*). In all Carpathian countries the ratio of people employed in agriculture is the lowest in the regions around their capitals: Vienna, Budapest, Bucharest and Bratislava, where the ratio of total employment is the highest. In the most backwarded Czech, Slovak and Hungarian regions with the lowest general employment ratio the ratio of people employed in agriculture is also the lowest on national level (*Figure 12*). However, in the most backwarded Romanian regions the ratio of people employed in agriculture is the highest.

Table 29

The ratio of total employed and employed persons in agricultural sector of Ukraine (2005)

Regions	Total number of persons (1000 persons)	Employed persons		Persons employed in agriculture*	
		1000 persons	%	1000 persons	%
1. Zakarpattia oblast	992.3	551.0	55.5	157.6	28.6
2. Lviv oblast	1,907.1	1,064.6	55.8	212.9	20.0
3. Ivano-Frankivsk oblast	1,013.5	522.5	51.6	135.8	26.0
4. Chernivtsi oblast	664,2	361.7	54.5	105.6	29.2
Ukraine	35,821.2	20,680.0	57.7	3,986.3	19.3

*Agriculture, forestry and fishing.
Source: Eurostat.

13.2 Land use structure

The Carpathian region has various soils and for this reason its land use structure was also varied during the past centuries. It was influenced by the given country's market situation, overall economic development and other factors.

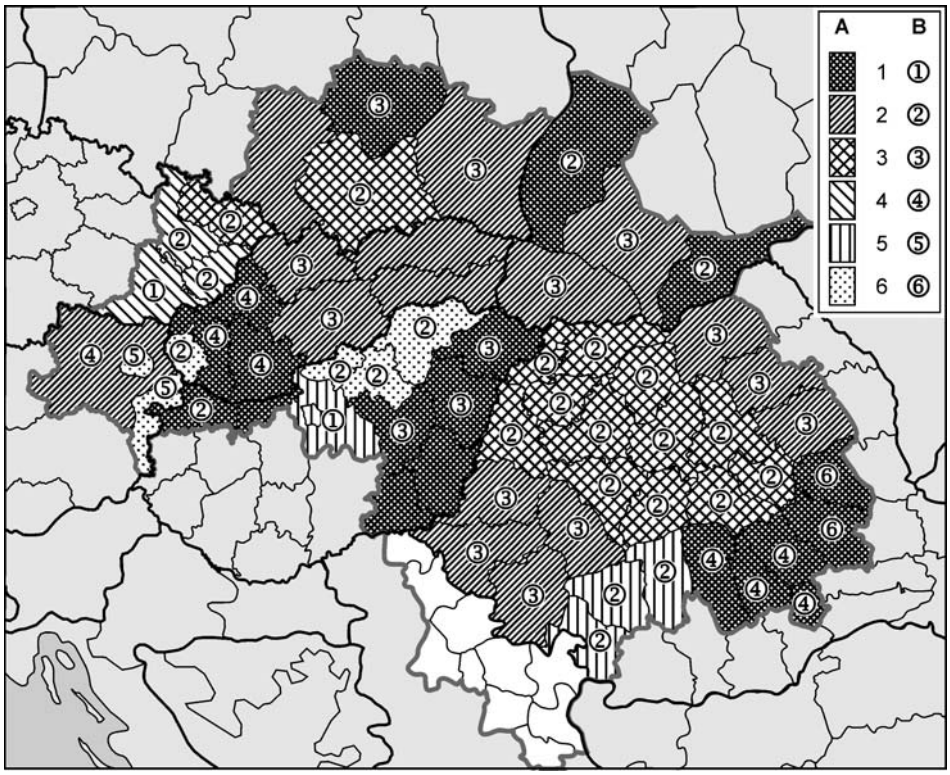
13.2.1 Austria

The ratio of utilized agricultural areas is especially low in the Vienna region which can be explained by the area's urbanization.

In Lower-Austria the ratio of green fodder, while in the other two Austrian regions the ratio of permanent crops are extraordinarily high but in Burgenland the ratio of fallow is also high (*Table 30, Figure 13*).

Figure 13

The land areas by land use in Carpathian regions (2004)



Key: 1 – Arable land; 2 – Forest; 3 – Grassland; 4 – Green fodder; 5 – Permanent crops; 6 – Vineyards. A – Land use (primary); B – Land use (secondary).
Source: Eurostat.

13.2.2 Czech Republic

The three Carpathian regions of the Czech Republic are in the Jihovýchod region where the ratio of utilized agricultural area is the highest (*Table 31*). Here, in the same regions the ratio of arable land is also high (*Figure 13*) and the ratio of green fodder on arable land here is the highest. The other two Czech regions are mainly covered by forest and wooden areas.

Table 30

The structure of land use in Austria (2004)

Regions	Total area	Utilized agricultural area		Arable land		Forest Wooded area		Private gardens		Grassland		Green fodder on arable land		Fallow		Permanent crops		Vineyards	
	1000 ha	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
1. Burgenland	396.5	188.1	47.4	153.0	38.6	81.1	20.5	0.4	0.1	19.9	5.0	10.3	2.6	20.1	5.1	14.7	3.7	13.6	3.4
2. Lower-Austria	1917.8	696.2	49.1	696.2	36.3	635.2	33.1	2.0	0.1	211.5	11.0	78.6	4.1	52.0	2.7	32.0	1.7	29.0	1.5
3. Wien	41.5	5.7	22.4	5.7	13.7	13.0	31.3	0.1	0.2	2.3	5.5	0.1	0.2	0.6	1.5	1.2	2.9	1.0	2.4

Source: Eurostat.

Table 31

The structure of land use in Czech Republic (2004)

Regions	Total area	Utilized agricultural area		Arable land		Forest Wooded area		Private gardens		Grassland		Green fodder on arable land		Fallow		Permanent crops		Vineyards	
	1000 ha	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
1. Jihovýchod	1399.2	750.1	60.7	624.2	44.6	406.9	29.1	0.6	0.0	103.5	7.4	110.8	7.9	5.2	0.4	22.7	1.6	16.0	1.2
2. Střední Morava	912.3	400.8	52.0	293.0	32.1	336.3	36.9	0.4	0.1	103.1	11.3	49.6	5.4	2.5	0.3	4.4	0.5	0.6	0.1
3. Moravskoslezsko	553.5	223.2	51.5	146.6	25.4	196.3	35.4	0.2	0.0	81.8	14.8	23.2	4.2	2.4	0.4	0.6	0.1	0.0	0.0

Source: Eurostat.

13.2.3 Hungary

In the Carpathian region some regions of Hungary, especially in North-Hungary, Central-Hungary and Southern Great Plain are the only places with significant ratio of private gardens (*Table 32*). This country has the highest ratio of arable land in the Carpathian region. North-Hungary has large vineyard territories (*Figure 13*).

As the author of this paper is Hungarian, she could take a look not only at the Eurostat data but also at the Statistical Yearbook of Agriculture published by the Hungarian Central Statistical Office. On the basis of these two publications she could make a comparison and take her major research notes on Hungary as follows:

1. The utilized agricultural area is the most important data of land use, and it was a major problem that the relevant Eurostat data are incorrect.[9]
2. On the basis of the above statement it seems that not all data match within the two statistical sources: the following land use data are matching: total area, arable land, forest, private gardens, garland and vineyards.
3. The following land use data are not matching: utilized agricultural area and permanent crops.
4. The following land use data are included in Eurostat but excluded from the Hungarian Statistical Yearbook of Agriculture: green fodder on arable land and fallow.
5. And finally certain data are included in the Hungarian Statistical Yearbook of Agriculture but excluded from Eurostat: reeds, fishpond and uncultivated land. Uncultivated land is a significant part of total land area, on national level about 17%, fit and it is not identical with fallow.
6. It may occur that utilized agricultural area data in Eurostat are incorrectly given in the case of other Carpathian countries as well. Nevertheless, for a better comparison this paper still provides Eurostat data of each country.

13.2.4 Poland

In Poland the highest per capita area of fallows is in the Carpathian region (*Table 33*) but Poland has no vineyards. The ratio of wooded and grassland areas is dominant (*Figure 13*). The ratio of arable land is significant in Świętokrzyskie only, this explains the high ratio of people employed in agriculture there (*Figure 12*).

[9] To illustrate the difference between data let me give an example for the territory of utilized agricultural areas in Central-Hungary. It is 395.1 thousand hectares (according to Eurostat) and 299.6 thousand hectares (according to the Statistical Yearbook of Agriculture).

Table 32

The structure of land use in Hungary (2004)

Regions	Total area	Utilized agricultural area		Arable land		Forest Wooded area		Private gardens		Grassland		Green fodder on arable land		Fallow		Permanent crops		Vineyards	
	1000 ha	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
1. Central-Hungary	740.4	395.1	53.4	299.6	40.5	151.6	20.5	12.9	1.7	63.4	8.6	11.0	1.5	23.2	3.1	19.5	2.6	6.7	0.4
2. Central-Transdanubia	1103.9	644.4	58.4	503.5	45.6	219.4	19.9	12.5	1.1	112.1	10.2	19.7	1.8	9.6	0.9	15.0	1.4	9.5	0.9
3. West-Transdanubia	1122.3	647.7	57.1	509.2	45.4	285.9	25.5	9.9	0.9	114.1	10.2	21.2	1.9	11.2	1.0	14.3	1.3	7.3	0.7
4. North-Hungary	1312.0	746.4	56.5	498.3	37.7	377.2	18.6	18.2	1.4	194.2	14.7	10.7	0.8	28.8	2.2	37.2	2.8	22.7	1.7
5. Northern Great Plain	1817.2	1268.6	69.8	970.8	53.4	202.7	11.2	14.6	1.8	337.3	13.1	22.3	1.2	14.8	0.8	44.9	2.5	4.1	0.2
6. Southern Great Plain	1846.6	1320.6	71.5	1028.6	55.7	226.9	12.3	18.6	1.0	227.4	12.3	21.5	1.2	19.1	1.0	45.9	2.5	29.7	1.6

Source: Eurostat.

Table 33

The structure of land use in Poland (2004)

Regions	Total area	Utilized agricultural area		Arable land		Forest Wooded area		Private gardens		Grassland		Green fodder on arable land		Fallow		Permanent crops		Vineyards	
	1000 ha	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
1. Małopolskie	1519.0	744.6	49.0	485.4	22.0	444.3	29.3	4.4	0.3	245.8	16.2	41.4	2.7	59.6	3.9	13.9	0.9	–	–
2. Śląskie	1233.1	485.8	39.4	367.6	27.8	397.4	32.2	2.4	0.2	109.9	8.9	22.0	1.8	85.2	6.9	8.4	0.7	–	–
3. Podkarpackie	1784.4	768.1	43.1	542.6	30.4	660.7	37.0	4.6	0.3	215.5	12.1	22.7	1.3	113.9	6.4	11.9	0.7	–	–
4. Świętokrzyskie	1170.8	653.0	55.8	493.8	42.2	326.4	27.5	0.8	0.1	133.0	11.4	15.9	1.4	85.7	7.3	26.3	2.3	–	–

Source: Eurostat.

13.2.5 Romania

In Romania the ratio of utilized agricultural areas is high (*Table 34*). A large part of the country has significant ratio of forest and grassland, while other parts of the country are rich in arable land (*Figure 13*).

13.2.6 Serbia

Serbia's Carpathian region part can be divided into lowland and highland areas from the aspects of agriculture. The Middle-Banat, North-Banat, South-Banat and Danube-bank regions are plains with fertile soils favouring cereal and industrial crop farming. Extensive areas of vine growing are available here only on the sandy soils of the South-Banat region near Veršec. Corn production here is serving for intensive stock breeding purposes. Besides subsistence farming competitive agriculture has a significant role on 50–500 hectares of private farms and state-owned agricultural-industrial complexes. In the Braničevčki, a Morovski, Borski, Zaječarski and Nišavski regions highland agriculture is dominating with pasturing and crop farming as main profile but in the valleys only. This area also has extensive forests. Some places of the area's western part are fruit-farming while the eastern parts vine growing sites. This kind of agriculture – due to the fragmented structure of land properties – is dominated by subsistence farming activities.

13.2.7 Slovakia

Slovakia is rich in forests and wooded areas (*Table 35, Figure 13*). Its physical geographical conditions are excellent for forestry purposes. Tilling of arable land is important in Západné Slovensko region only.

13.2.8 Ukraine

Forestry is an important industry of primary sector of economy in the Carpathians region considering its natural and geographic conditions. In 2005 forest area of four Carpathians oblasts amounted to 2268 thousand hectares, which is 21,0% of forest reserve of Ukraine.

Ukraine owns the biggest agricultural area in Europe of about 48 million hectares that is good for large scale farming. More than 76% of agricultural land is used for arable farming. Pasture and grazing land take up 18%, permanent crops (such as vines) occupy about 2% of agricultural land (*Table 36*).

Table 34

The structure of land use in Romania (2003)

Regions	Total area	Utilized agricultural area		Arable land		Forest Wooded area		Private gardens (2007)		Grassland		Green fodder on arable land		Fallow		Permanent crops		Vineyards	
	1000 ha	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
1. Nord-Vest	3416.0	2076.6	60.8	1008.0	29.5	1043.6	30.6	26.4	0.8	1006.1	29.5	227,5	6,7	24.2	0.7	62.5	1.8	14.8	0.4
2. Centru	3410.0	1932.6	56.7	767.4	22.5	1242.7	36.4	18.5	0.5	1134.0	33.3	204,4	6,0	26.9	0.8	31.3	0.9	12.0	0.4
3. Nord-Est	3685.0	2109.0	57.2	1349.6	36.6	1236.1	33.5	41.9	1.1	687.6	18.7	260,0	7,1	5.2	0.1	71.8	2.0	42.7	1.2
4. Sud-Est	3576.2	2324.7	65.0	1794.3	50.2	599.7	15.7	25.5	0.7	397.3	11.1	135,2	3,8	24.8	0.7	139.1	3.7	106.4	3.0
5. Sud-Muntenia	3445.3	2448.4	71.1	1964.2	57.0	678.1	19.7	27.5	0.8	374.6	10.9	177,7	5,2	7.6	0.2	109.7	3.2	51.7	1.5
6. Bucuresti-Ilfov	182.1	117.4	64.5	110.3	60.6	25.6	14.1	2.7	1.8	2.5	1.4	13,4	7,4	1.8	1.0	4.6	2.5	2.1	1.2
7. Sud-Vest Oltenia	2921.2	1826.5	62.5	1244.7	42.6	850.4	29.1	15.9	0.5	467.4	16.0	101,3	3,5	8.4	0.3	114.4	3.9	52.2	1.8
8. Vest	3203.3	1961.9	61.3	1098.5	34.3	1043.9	32.6	19.5	0.6	820.6	25.6	143,6	4,5	15.3	0.5	42.7	1.3	10.6	0.3

Source: Eurostat.

Table 35

The structure of land use in Slovakia (2004)

Regions	Total area	Utilized agricultural area		Arable land		Forest Wooded area		Private gardens		Grassland		Green fodder on arable land		Fallow		Permanent crops		Vineyards	
	1000 ha	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
1. Bratislavský kraj	205	84	41.0	72	35.1	75	36.6	2	1.0	6	2.9	11	5.4	2	1.0	4	2.0	3	1.5
2. Západné Slovensko	1499	843	56.2	743	49.6	382	25.5	18	1.2	67	4.5	35	6.3	2	0.1	15	1.0	9	0.6
3. Stredné Slovensko	1626	469	28.8	214	13.2	840	51.7	6	0.4	246	15.1	58	3.6	2	0.1	3	0.2	2	0.1
4. Východné Slovensko	1573	539	34.3	332	21.1	707	45.0	6	0.4	196	12.5	72	4.6	5	0.3	5	0.3	2	0.1

Source: Eurostat.

Table 36

The structure of land use in the Carpathians region of Ukraine (2007)

Regions	Total area, 1000 ha	Forest Wooded area		Total agricultural area		Agricultural land use									
						arable land		grassland		fallows		orchard		vineyard	
		1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
1. Zakarpattia oblast	1,275.3	694.0	54.4	453.5	35.6	200.5	44.2	2,25.9	49.8	0.0	0.0	13.6	3.0	4.6	1.0
2. Ivano-Frankivsk oblast	1,392.7	626.0	44.9	633.3	45.5	372.4	58.8	2,13.7	33.7	30.7	4.8	9.6	1.5	0.1	0.0
3. L'viv oblast	2,183.1	689.9	31.6	1,268.5	58.1	797.2	62.8	4,47.7	35.3	0.7	0.1	13.8	1.1	0.1	0.0
4. Chernivtsi oblast	809.6	258.0	31.9	472.3	58.3	336.5	71.2	1,09.9	23.3	0.0	0.0	14.4	3.0	0.1	0.0
5. The Ukrainian Carpathians	5,660.7	2,222.9	39.3	2,827.6	50.0	1,706.6	60.4	9,97.2	35.2	31.4	1.1	51.4	1.8	4.9	0.2
6. Ukraine	60,354.8	10,800.0	17.9	41,675.9	69.1	32,446.2	77.9	79,38.8	19.0	392.2	0.9	280.7	0.7	93.0	0.2

Source: National Statistical Office of Ukraine.

14 The approach to tourism and natural/cultural heritage in the Carpathians region

14.1 Tourism

The economic impact of tourism, the role of tourism – the "business sector of the 21st century" – in economic and regional development has been a commonplace for a long time. In the 1990s the relatively rapid general growth of the world economy created favourable conditions for the growth of tourism. Presently tourism accounts for approximately 12% of the world's GDP and employs over 200 million people worldwide. In 2005 the number of tourist arrivals reached 808 million, exceeding all previous figures.

The year 2007 has started with a very positive growth of global tourism. From January through April, international tourist arrivals worldwide rose by over 6% to 252 million, representing an additional 15 million arrivals as against the same period in 2006. Asia and the Pacific (+9%) achieved the strongest growth, followed by Africa (+8%), the Middle East (+8%) and Europe (+6%). Several positive factors contributed to the growth registered in the first four months of this year, and are likely to help sustain it through the coming months.

Continuing world prosperity has clearly been a main driver. Emerging markets and developing economies in general, and especially those of Asia, maintained their extraordinary strength. Meanwhile, in continental Europe, and in Germany in particular, economic growth has picked up substantially. With increasing disposable income and factors such as the continued development of low cost airlines making travel available for larger shares of population, international tourism has a development potential for another year of above average growth.

The growing recognition of tourism's contribution to economic growth and job creation means that it is being given more and more attention by national governments, especially those in developing regions. Increased investment in infrastructure, marketing and promotion, development of domestic markets, liberalization of air transport, growing intraregional cooperation, and a growing number of public-private partnerships are key factors that have helped the tourism industry to expand.

Although Europe (+6%) is the world's most visited and most mature destination region, its arrivals growth rates in 2005 and 2006 were not far short of the worldwide average. And growth continued even more strongly through the first four months of 2007 supported by the sustained boom in the world economy – a boom in which Europe is now sharing more emphatically, with notably higher rates of GDP growth in the eurozone (Source: World Tourism Organisation).

A social and economic phenomenon of this volume has a huge influence on the economic, social and cultural life of the concerned countries and greatly contributes to the alteration of the physical environment of the human kind.

The impacts of tourism can be classified as economic, socio-cultural and physical-environmental effects. The economic impacts of tourism can be taken as changes in the economic features and economic structure of places of origin and destinations, induced by tourism; the physical-environmental effects are changes taking place in the natural and the built environment of destinations as an effect of tourism; the social effects are changes that take place in the quality of life of the people of the destination (and to a lesser extent in the lives of the tourists) as a development of the tourism sector. While the economic impacts are visible in both the places of origin and destinations (although they are usually stronger at the destinations), the socio-cultural and the physical-environmental effects are much more striking at the destinations.

There are possible overlaps among the economic, physical and cultural impacts of tourism. E.g. the development of infrastructure needs in order to meet tourism demand or on the basis of revenues from tourism can be seen both as economic results and as factors improving the quality of life of the local population; on the other hand, the conditions of the natural environment are mostly negatively affected by the infrastructure investments.

If we concentrate on the socio-cultural impacts of tourism, the social effects are the changes in the everyday lives of the local population, the adaptation of the local citizens to the presence and operation of tourism, whereas the cultural effects are those changes in the value system of the local population which also influence the social relations and the material culture of the local community.

The social effects of development or transitions can be categorised in the following way (*Rátz,* 1999):

- Grouping of the social impacts of tourism:
- Impacts on the population.
- Change in the number of population.
- In outflow of temporary employees.
- Presence of temporary population (holidaymakers).
- Movement of individuals and families.
- Change of the distribution by age, gender, race and ethnic group.
- Urbanisation of the population.

Transformation of the labour market:

- Creation of new jobs.
- Growth of seasonal employment.
- Diversification of the economic activities.

– Increase in the economic disparities.
– Changes in the employment opportunities of the minority groups.
– Change of employment possibilities.

Transformation of the community features and structure:

– Emergence of new social classes.
– Change in the economic orientation of the community.
– Emergence of weekend (recreation) residents.
– Conflicts with those coming from the outside.
– Transformation of the political, social, religious and ethic value systems.
– Emergence of religious differences within the community.
– Changes in the infrastructure of the community.
– Changes in the access to land and disposition over land.

Changes at the individual and family level:

– Disturbance of the daily routine.
– Change of the family structure.
– Disintegration of the social networks.
– Change of the attitudes towards public health and public security.
– Changes in leisure activities.
– Transformation of the consumption patterns.

Impacts on the natural and cultural resources:

– Increased protection of resources.
– Damage or deterioration of resources.
– Crowdedness, over-exploitation, pollution.
– Commercialisation.
– Transformation of traditions and habits.

The regions of the Carpathian Mountain Range have usually many tourist attractions and relatively long traditions of tourism.

The following section is to illustrate the main tourism endowments of the countries constituting the Carpathians cooperation area, with special emphasis on the regions in the respective countries that are actually located in the Carpathian's physical geographical area.

14.1.1 General features of the tourism endowments in the cooperation area

Austria, the Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia and Ukraine have relatively little in common, especially e.g. between Austria and Serbia, two countries that do not even have territories directly belonging to the Carpathian Mountain Range. Slovakia has practically its entire territory in the cooperation area (and much of the country in the actual mountain range), relatively large parts of Romania belong to the Carpathians, whereas in the Czech Republic and Poland it is a much smaller part of the country, in Ukraine a negligible part of the vast country is part of the cooperation region in question. Hungary has no direct physical geographical part on the Carpathians mountain range, either.

In Austria, Serbia and Romania the relatively more advanced region(s), in Hungary and Poland the less developed ones, in Ukraine definitely the poorest region make parts of the cooperation area, so the socio-economic development level across the Carpathian's area is varied. The facts that the mountain range is less suitable for intensive agricultural activities and in some cases they are the least developed parts of the respective countries make a large the Carpathians cooperation area suitable for the environmental conscious forms of tourism (ecotourism). The Carpathian EcoRegion Initiative (CERI) is a cooperation of seven of the eight respective countries (all but Austria), in which the development of tourism is an important activity. The CERI Tourism Working Group was established to support high quality tourism with special focus on ecotourism in the Carpathians, which has an enormous potential to bring together nature conservation and rural development. The working group consists of CERI members from all over the Carpathians. At their first workshop held on October 2-3, 2006, not only members of the CERI Tourism WG, but also interested people working in the field of ecotourism or in Protected Area Authorities, came together to actually set up the group and discuss future plans. The group elaborated the list of threats and obstacles for sustainable development in terms of sustainable tourism in the Carpathians. Furthermore, the CERI Tourism WG agreed to develop a Carpathian-wide ecotourism project, which will be its major task for 2008 and will help to strengthen the 'Corporate Identity' within the Carpathians.

14.1.2 Basic tourism endowments of the respective countries of the Carpathian regions

Austria

In Austria the most advanced areas of the country (Lower Austria including Vienna) are parts of the Carpathians cooperation area. Given the importance of the tourism sector in Austria (around the eighth-tenth position as regard international tourism revenues and the first place in the world as regards the tourism revenues per capita), the project area is also a very important tourism destination with many sorts of attractions (architecture, arts, events and festivals, skiing, water sports, hiking etc.) Lower Austria is a colourful mosaic of its counties, each with an individual attraction (huge pear tree fields, impressive wine terraces like in the Wachau valley, many wine cellars and cellar lanes in the country around Retz, wine taverns in the spa region and primeval forests like along the Danube, March and Thaya rivers.

Czech Republic

The White Carpathian's territory was established hundreds of years ago and has the character of an extensive English park. The forest areas (45%) alternate flowery meadows with solitary, ragged oaks and beeches. It is unique in Europe.

This is the southwest end of the Carpathian Mountain range, which includes highlands and mountainous areas in the Moravian part of the White Carpathian Mountains, in the regions of Zlín, Hodonín and Uherské Hradiště. The White Carpathians are orchid flower meadows in the vicinity of Čertory, the picturesque landscape of Kopanice, with scattered settlements and an area of beech groves in the surrounding area of the Vlárský Pass. The mountain range of the White Carpathians extends over the border between the Czech Republic and Slovakia at a length of over 80 kilometres.

The Czech part of the protected landscape area is 70 kilometers long. The White Carpathians represent an exceptional area among large-scale protected areas in the Czech Republic, above all because this area is the highest mountain range in the southwest border of the actual Carpathian Mountains.

The White Carpathians are a European biosphere reservation in terms of the Man and Biosphere program (MAB) implemented by UNESCO.

The White Carpathians have become known for being a territory with the highest level of diversity and greatest number of orchidaceous plants (orchids) in Central Europe.

Poland

Poland has one of the most varied tourism assets in the cooperation area. Mountains, forests, sandy beaches, culture and more than a thousand years of history – all that can be found here and the country is becoming more and more popular as a holiday destination.

The Carpathian and Sudety Mountains form Poland's southern boundary with the highest summit in the country, the Rysy (2,499 m), located in the Tatra Mountains. Probably one of Poland's greatest attractions is nature, coming from the variety of breathtaking natural landscapes. Wild, untouched, more diverse than in most countries either in Europe or the world and, what is more, easily accessible. Tourists value this greatly and their number is constantly increasing.

Zakopane, Poland's premier mountain resort and one of the country's most popular holiday destinations, both in the winter for skiing, and in the summer, for hiking and camping, can be found in the Carpathian part of Poland. The town called the Winter capital of Poland lies in the southern part of the Podhale region, at the foothills of the Tatra Mountains, with the exception of the Karkonosze mountains the only Alpine mountain range in this part of Europe. Zakopane is the biggest Polish centre of mountain hiking and skiing. The town is visited by about 2,000,000 tourists a year.

The Carpathian area of Poland is home to several national parks of which the tourism value is ever increasing. These national parks are the Babia Gora National Park (region of Malopolska), on the border with Slovakia; the Bieszczady National Park, the third largest national park in Poland, also located at the border with the Slovak Republic and Ukraine. The Park is populated by a relative high number of species, which are considered to be threatened or rare in other parts of Europe (particularly large carnivorous mammals such as bears, wolves and lynxes); the Gorce National Park in the central and north-eastern part of Gorce mountain range, in southern Poland (region of Malopolska), where forests, most of which exceed 100 years of age, cover almost 95% of the Park's area; the Góry Stolowe National Park, spreading over the Polish part of the Stolowe Mountains, which create the central part of Middle Sudety range, in south-western Poland (region Lower Silesia) of on the border with the Czech Republic. The Park has huge and dense forests; the Karkonosze National Park (in Dolnoslaski region in south-western Poland at the border with the Czech Republic. Karkonosze), the highest mountain group of the Sudety range; the Magura National Park (located in Podkarpackie and Malopolskie regions), the river head of the Wisloka, a typical mountain river which together with its many tributaries is a significant element of the landscape, forming picturesque gorges and bends and often changing directions. The Park is one of the richest animal mainstays in the Beskid Niski range; the Ojców National Park (in Malopolskie region), the smallest National Park in

Poland, with a surface built of Jurassic limestone, where karst waters sculpted in the valleys peculiar landscape forms, steep canyons and various rocks and mogotes; the Pieniny National Park in the Pieniny Mountains in Malopolskie region at the border with the Slovak Republic, formed of various types of limestone, the hardest of them, called cornstone, forming picturesque, almost vertical white cliffs over the Dunajec river; and finally the Tatra National Park, located in Malopolska region, at the border with the Slovak Republic, founded in 1954 to protect the Tatra Mountains. The Park is founded on the area of the youngest, highest and Poland's only Alpine mountains with diverse relief and height differences reaching up to 1700 m. The highest peak in the Polish part of the Tatras is Mt. Rysy (2,499 m). The Park has more than 650 caves, 6 of which are open for tourists. The Park has numerous streams and about 30 lakes, which are an important element of the landscape of the High Tatras.

Romania

The National Tourist Office of the country does not specifically list the Carpathians among the main tourism attractions of Romania on their official website, but some attractions among the special interests contain a Carpathian elements. These elements are listed in the pages below.

The Dracula Legend

Many "Dracula Tours" are being offered throughout Romania, including the most important historical places related to Vlad Tepes, such as 14th century town of Sighisoara – Vlad's birthplace; the Snagov Monastery – where, according to legend, Vlad is said to be buried after his assassination; Castle Bran (Castle Dracula); the Poenari fortress; the village of Arefu – where many Dracula legends are still told; the city of Braşov – where Vlad led raids against the Saxon merchants; and, of course, Curtea Domneasca – Dracula's palace in Bucharest.

German (Saxon) Heritage

Romania's significant German (Saxon) heritage is obvious in Southern Transylvania; Transylvania is home to hundreds of well-preserved Saxon towns, villages and fortified churches built between the 13th and 15th centuries by Saxons. Saxons came to Transylvania during the mid 1100s from the Rhine and Moselle Rivers' regions. The result of almost nine centuries of existence of the Saxon (German) community in Southern Transylvania is a cultural and architectural heritage, unique in Europe. Besides the well-known Sighisoara, Sibiu and Braşov the following towns also feature a unique Saxon Heritage: Biertan, Saschiz, Medias, Sebes, Bistrita, Cincu, Prejmer, Harman, Rupea.

Arts & Architecture

Romanians' vivid imagination and intense spirituality have always been expressed through their architecture. Fortunately, they also have strong preservation instincts, resulting in village museums that display bygone ways of life through found and restored peasant houses, elaborately carved gates, barns and other architectural elements. Such a museum in the cooperation area is the Museum of Peasant Techniques (Muzeul Tehnicii Populare) in Sibiu, with collections of early farm tools and household implements.

Romania's most renowned architectural treasures in the Transylvanian region are Black Church (Braşov), Bran Castle (Bran), Brukenthal Palace (Sibiu), Hunedoara Castle (near Deva), Sighisoara Medieval Town, Sibiu – Old Town, Braşov – Old Town, Fortified Churches in Biertan, Harman and Prejmer; in Maramureş the most interesting places to visit are the Wooden Churches, Wood Museum, Sighet Synagogue (Sighetu Marmatiei), and Satu Mare Synagogue, as well as the traditional villages of wooden houses, many with sculpted designs on balconies and around the entrances, towering carved wooden gates, attached to fences half their size, rising even in front of modest dwellings. Popular motifs include grapevines, acorns, twisted rope, sun symbols, crosses and forest animals. The villages of Barsana and Oncesti have, perhaps, the greatest number of impressive gates.

Hardly a village lacks its own small wooden church dating back to the 17th and 18th centuries. These are exquisite, high-steepled jewels with multiple gabled roofs, all of the pattern, yet each distinctly unique. Seeing at least a few interiors is a must as many frescoes remain at in good condition.

While the main tourist activities in Maramureş are gate-, church- and people-viewing, the town of Sighetu Marmatiei has a few attractions worth visiting. The outdoor village museum, on the road into town, boasts of dozens of homes and farm buildings assembled from around Maramureş County.

Slovakia

Tourism in Slovakia began to develop in the mid-19th century, when travellers started to visit the High Tatra and Low Tatra Mountains. The first accommodation and catering facilities were built in the late 19th century and this development was accelerated after 1918 with the creation of Czechoslovakia. After the fall of Communism in 1989, Slovakia's tourism began to adapt to the conditions of market economy. The facilities were gradually privatised and new facilities were built.

Tourism in Slovakia offers natural landscapes, mountains, caves, medieval castles and towns, folk architecture, spas and ski resorts. The most attractive destinations are the capital of Bratislava and the High Tatras. Some 40% of Slovakia is covered with forests which, contain a wide biodiversity and animals. Slovakia

features a high percentage of wildlife included in protected areas. There are hardly any mountain ranges and areas not protected in some way. Among Slovakia's main tourist attractions we find the Tatra Mountains, particularly the High Tatras), the highest part of the Carpathians. They feature many rare plant and animal species and offer numerous ski, hiking and mountaineering opportunities.

Rivers and streams in the mountains of Slovakia are often used for rafting and other white-water based activities and sports. The use of rafts has a very long tradition and especially rafts on the spectacular Dunajec river are very popular among tourists.

Slovakia contains numerous mineral springs and spas. Slovakia's spas, including Balneological spas (Bojnice, Brusno, Dudince, Lúčky, Piešťany, Sklené Teplice, Sliač, Smrdáky, Trenčianske Teplice, Turčianske Teplice), climatic spas (Nový Smokovec, Štós, Štrbské Pleso, Tatranské Matliare, High Tatras) and mixed spas (Bardejovské Kúpele, Číž, Nimnica, Rajecké Teplice and Vyšné Ružbachy).

New water parks are mushrooming throughout the country (for example Tatralandia in Liptovský Mikuláš, Aquacity in Poprad, and Aquathermal in Senec).

Slovakia's karst areas offer an extremely high number of caves and their list is being expanded every year due to new discoveries. The number of caves per capita is among the highest ones in Europe. Thirteen caves are open to the public, the longest one being 9 kilometres long. Some of them have been proclaimed UNESCO's World Heritage Sites. Among them, Ochtinská Aragonite Cave is one of three aragonite caves in the world.

Slovakia has a lot of castles, most of which are in ruins. The best known castles include Bojnice Castle (often used as a filming location), Spiš Castle (the largest fortified castle in Europe, on the UNESCO list), Orava Castle, Bratislava Castle, and the ruins of Devín Castle. Čachtice Castle used to be home of the world's most prolific female serial killer, the 'Bloody Lady', Elizabeth Báthory.

Due to Slovakia's central position in Europe and the country's past, most cities and towns are similar to the cities in the Czech Republic (such as Prague), Austria (such as Salzburg) or Hungary (such as Budapest) and are rather cosmopolitan. A historic centre with at least one square has been preserved in almost every town in Slovakia. Large historic centres can be found especially in Bratislava, Košice, Banská Štiavnica, and Levoča. Some towns have their own castles (for example Kremnica, Bratislava, and Banská Štiavnica). Most town centers have been rearranged in recent years.

Ancient stone churches can be found in virtually any village and town in Slovakia. Most of them are built in the Baroque style, but there are also many examples of fine Romanesque and Gothic architecture. The St. James Church in Levoča (with the highest wood-carved altar in the world) and the Church of the

Holy Spirit in Žehra (with precious medieval frescos) are UNESCO's World Heritage Sites.

Very precious structures are the complete wooden churches of northern and northern-eastern Slovakia. Most were built from the 15th century onwards by Catholics, Lutherans and members of eastern-rite churches.

Slovakia is also rich in songs, dances, folk art, folk costumes and folk architecture.

The national parks of the country are Vysoke Tatry, Nizke Tatry, Mala Fatra, Slovensky raj, Pieniny, Poloniny and Muranska planina.

Ukraine

The region of Transcarpathia is one of the most picturesque places in the country and has particularly pleasant conditions for tourism and recreation development. Transcarpathia is considered to be one of the best ecological regions in the country.

The diversity of landscape, unspoiled countryside, and a temperate climate create favourable conditions for recreation and skiing in winter. Mineral and thermal water resources contribute to the development of tourism and leisure activities as one of the main fields in the regional economy.

Nowadays the regional system of sanatoria and tourist-recreation institutions is one of the biggest in Ukraine, numbering 17 sanatoria, 19 sanatorium-preventive clinics, more than 70 tourist centres, leisure centres, and medical and health care institutions. The system can cater for more than 12,000 people at any time.

The pride of the region is "The Centre of Europe", Lake Synevyr, Narcissus Valley and many others. The Biosphere reserves, national and regional parks, which cover an area of more than 130 hectares, are also major tourist attractions.

Some 62 agencies and enterprises provide tourism services in the region.

Construction of new modern hotels, tourist and skiing centres continues apace. In the last few years the following centres and complexes were opened: tourist centre Podobovetz' (Mizhgirya district); tourist and health care complex Vojevodyno (Perechyn district); hotel complex At Taras's Place (Svalyava district); motel Nadiya (village of Volovetz); and the hotels Duet, Eduard and Atlant (Uzhhorod).

About 600 tourist itineraries and routes facilitate the development of internal tourism throughout the region by way of hiking, bus, train, skiing routes and children's excursions.

Transcarpathia is famed for its landmarks. There are several notable historical, archeological and architectural heritage sites in the region. The best known among them are: Fortress of Uzhhorod (16th century); Castle Palanok in Mukachevo (14th–17th centuries); Palace of the Counts Schönborns in the village of

Chynadievo; fortifications (castles) in Khust, Korolevo, Serednye, and Nevits'ke villages. There is much to see of preserved local folk heritage.

Recently the countries of Central and Western Europe have started showing particular interest in non-traditional types of tourism and recreation in the region, e.g. rural, bicycle and ecological tourism. At present many locals are eager and able to be hosts to visitors from other regions and abroad.

Many tourist and recreation services in Transcarpathia are based on natural resources. Top place belongs to mineral waters, whose medicinal characteristics were mentioned in the ancient archive documents of the mid-15th century. Some deposits are unique, and their water is effective and valuable for sanatorium treatment and preventing diseases of the digestive organs, vestibular and locomotion systems, and cardio-vascular and peripheral nervous systems. The most popular among the sanatoria are: Svalyava district – Sonyachne Zakarpattya, Polyana, Kvytka Polonyny'; Mukachevo district – Karpaty, Synyak; Mizhhirya district – Verhovyna; Khust district – Shayan.

Ecological and rural tourism is a significant development factor in the mountain areas of the region, especially in Rakhiv district, supported by the Carpathian Foundation. There, an ecological route has been created through Chornohirya virgin forests to as far as Hoverla, Transcarpathia's highest summit.

Hungary

Although most foreigners only acknowledge the capital city, Budapest and the Lake Balaton, and perhaps the "puszta" (Great Hungarian Plain) as the tourism destinations in Hungary, there is much more in Hungary than these. Despite repeated historical disasters which devastated both the people and their heritage, much remains of great value that is worth visiting and getting to know, including 2000-year-old Roman ruins and 400-year-old Turkish monuments (which can sometimes be found side-by-side), beautiful churches from the Romanesque period, stately castles, magnificent palaces functioning as hotels awaiting tourists. Hundreds of therapeutic mineral springs gush up from the depths, helping many thousands to recover their health (Hungary is among the world's richest countries in thermal and mineral waters); the rich Hungarian folk art also attracts a number of tourists.

Among the physical geographical endowments of Hungary with a special value for tourism are the ten national parks in Hungary. In addition to the visit to national parks, several other nature-based activities can be pursued in many places in Hungary, including hunting, angling, horse riding etc. Gastronomy and the historic wine producing regions (and the established wine roads) are also attractions of international recognition.

Hungary is becoming a more and more popular MICE (meetings, incentives, conferences, events) tourism destination (congresses, arts festivals, summer universities, international fairs and exhibitions, sports events etc.).

In those areas of Hungary where the favourable physical geographical conditions are matched by cultural and economic assets, contiguous tourism regions were born. The most important of these is the Selected Holiday Region of the Lake Balaton, but there are other significant tourism regions such as the Danube Bend, the Velence Lake, the Mátra and Bükk Mountains, Sopron–Kőszeghegyalja and the Mecsek–Villány region.

14.2 Heritage sites in the Carpathians area

14.2.1 Culture as a driving force of economic development

Culture used in the most comprehensive approach covers practically all fields of life from the mother language, education, sports, arts, public collections, cultural heritage, media, higher education, science, moral life and faith. Nevertheless in the public thinking it is usually only a narrower definition of culture that is frequently used: mostly arts, cultural heritage and media.

It is meaningless to put a sharp division line between traditional, "economic" products and cultural products. The economy cannot function efficiently and cannot be competitive in the long run without continuously absorbing culture, both as regards the methods of production and the final products, and – above all – the human communities, the individuals that create and operate the systems of productions and the physical goods themselves. Culture and economy are thus interrelated and mutually depend on each other. This also means that culture cannot exist without the financial support of the economy; the different forms of arts cannot exist without state support, or sponsorship.

Many studies have been carried out so far on the economic impact of cultural industry. The earnings in the cultural or creative industry are usually above the average; also, culture is a powerful tool to strengthen urban or regional identity which can be a valuable development asset of any territory.

There is a very tight correlation between culture and knowledge based society, for the creation of which many efforts have been made in many countries of the world. Although much of the literature and survey on the economic impact of heritage and culture is connected to the Anglo-Saxon countries of other parts of Western Europe, the growing interest in the countries involved in the Carpathians area is also indicated by the fact that culture is no longer considered as a "side-product" in these countries but as an import economic development tool.

14.2.2 Heritage sites in the Carpathian's area

Within culture, heritage is one of the most important assets on which development in general can be built on. In tourism, the role of natural and cultural heritage is even more important.

In this respect the regions in the Carpathians area are in a relatively good position, as most of the world heritage sites of the respective countries can be found in the regions of the Carpathians Mountain Range (*Table 37*).

A specific feature of the Carpathian area is that there are several areas inhabited by more than one nationality with distinctive cultural heritage and there are areas which were inhabited in the past by national and religious groups which do not live there any more. Several churches, synagogues, monuments and buildings became victims of national ideologies. These ideologies promoted and cared for the protection of national cultural heritage supporting their interpretation of national history, and neglected those elements of cultural heritage, which did not fit into this conception. Therefore, in all countries of the region legal and professional arrangements are needed to preserve the respect for and memory of all nations and nationalities, language and religious groups, which created a specific cultural heritage.

Table 37

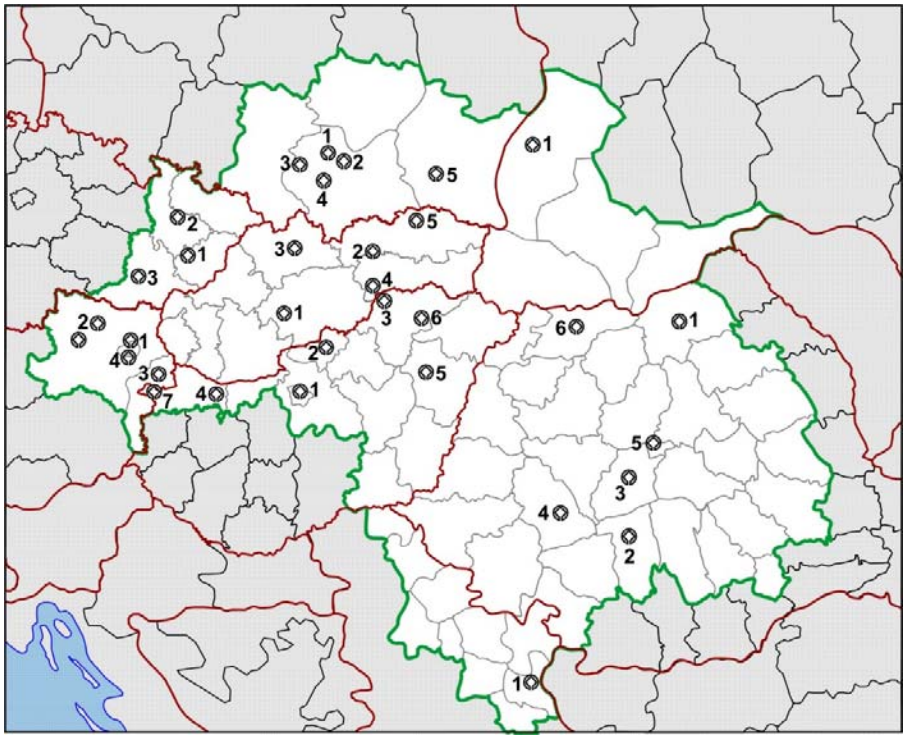
Total number of UNESCO world heritage sites in the countries of the Carpathian area and number of world heritage sites in the respective Carpathian regions in our survey

Country	Total number of UNESCO world heritage sites	Number of UNESCO world heritage sites in the Carpathian regions
Austria	8	4
Czech Republic	12	3
Hungary	8	7
Poland	13	4
Romania	7	6
Serbia	3	0
Slovakia	5	5
Ukraine	3	1

Source: UNESCO.

Figure 14

The World Cultural Heritage Sites of the Carpathians



Legend: Austria: (1) Palace and Gardens of Schönbrunn (1996); (2) Towns Krems, Melk; (3) Fertö/ Neusiedlersee Cultural Landscape (2001); (4) Historic Centre of Vienna (2001). *Czech Republic:* (1) Gardens and Castle, Kroměříž (1998); (2) Holy Trinity Column, Olomouc (2000); (3) Tugendhat Villa, Brno (2001). *Hungary:* (1) Budapest, including the Banks of the Danube, the Buda Castle Quarter and Andrássy Avenue (1987, 2002); (2) Old Village, Hollókő (1987); (3) Caves of Aggtelek Karst and Slovak Karst (1995, 2000); (4) Millenary Benedictine Abbey, Pannonhalma (1996); (5) Hortobágy National Park – the Puszta (1999); (6) Tokaj Wine Region Historic Cultural Landscape (2002); (7) Fertő/Neusiedlersee Cultural Landscape (2001). *Poland:* (1) Cracow's Historic Centre (1978); (2) Wieliczka Salt Mine (1978); (3) Auschwitz (Oswiecim) Concentration Camp (1979); (4) Kalwaria Zebrzydowska: the Mannerist Architectural and Park Landscape Complex and Pilgrimage Park (1999); (5) Wooden Churches of Southern Little Poland (2003). *Romania:* (1) Churches of Moldavia; (2) Monastery, Horezu; (3) Villages with Fortified Churches in Transylvania – Extension of "Biertan and its Fortified Church" (1993, 1999); (4) Dacian Fortresses of the Orastie Mountains (1999); (5) Historic Centre of Sighişoara (1999); (6) Wooden Churches of Maramureş (1999). *Slovakia:* (1) Historic Town, Technical Monuments, Banská Štiavnica (1993); (2) Spišský Hrad, Associated Cultural Monuments (1993); (3) Vlkolínec (1993) – Zilina Region; (4) Caves of Aggtelek Karst and Slovak Karst (1995, 2000); (5) Bardejov Town Conservation Reserve (2000). *Ukraine:* (1) L'viv – the Ensemble of the Historic Centre (1998). *Serbia:* (1) Ravanica monastery.

Source: Author's construction, UNESCO.

In the Carpathian region deliberate destruction of cultural heritage – experienced in the Balkan wars – did not occur. But some bias in favour of national heritage occurred. UNESCO World Cultural Heritage nominations serve for it as an example.

There are 36 registered UNESCO World Heritage items in the Carpathian area (*Figure 14*).

Poland signed the agreement with the UNESCO in 1976. Until 1997 no heritage site was nominated in the new territories, belonging formerly to Germany.

Romania signed the agreement in1990. The first Saxonian city, Sighisoara was nominated in 1999.

A large part of Ukraine's valuable architectural heritage – the countries only renaissance castles, palaces are in the Carpathian area which was part of Poland, Austria and Hungary at that time. So far only the inner city of L'viv is nominated.

The Carpathian area had 4 million Jewish inhabitants before World War II. No Jewish quarters or buildings (synagogues) are nominated so far from the region.[10]

After 1999, this attitude changed significantly and more nominations were made from the formerly neglected types of heritage.

[10] The Jewish Quarter of Třebíč int he Czech Republic is registered as World Heritage, but it is outside the Carpathian area in the region of Vysocina.

15 Research and development (R&D) activity in the Carpathian area

15.1 Introduction

This chapter is concerned with the role of innovation, particularly the main feature of R&D activity in the Carpathian area. It is based on the three main indicators of the Research and Development and spatial impact of the economic transformation on research and development. While in the early transition years, spatial differences were largely determined by FDI in manufacturing, the new directions of innovation have recently become the main driving force that differentiates economic space, although it is heavily concentrated in *urban agglomerations*. Preconditions for the innovation-led development are to a large extent jeopardised by the shallower innovation potential of (peripheral) regions and the dominant role of the capital cities' regions.

15.2 The economic significance of innovation in the transition economies of the Carpathian area

Innovation, and particularly R&D is considered to be a new policy tool for economic growth, and a large extent contributes to catching up in regional development. A great part of economic growth is attribute-able to technological improvement and innovation in wider sense, whereas capital accumulation explains only a smaller fraction of it. In the developed countries, 80% of the increase in productivity is due to some form of innovation. Innovation is vital in increasing the productivity of companies, improving export capacity, creating employment, and improving the level of services, in one word: increasing economic competitiveness. We use the term innovation to refer to the producing and transferring of new knowledge. Knowledge and access to it has become the driving force behind growth and competitiveness in advanced economies (*Gál,* 2005).

The ability to create, access and use knowledge is becoming a fundamental determinant of global and regional long-term development and competitiveness. Knowledge itself is considered to be one of the basic economic resources (*Drucker,* 1994). The knowledge-based economy (KBE), defined as becoming increasingly dependent and directly based on the production, distribution and effective use of knowledge and information. At the Lisbon Summit in March 2000, heads of state and government recognized the KBE as one of the highest priorities for the European Union. Moreover, they set a new goal – to become the

most competitive knowledge-based society in the world by 2010 (European Commission 2002). This corresponds to a slightly wider concept of the information society (IS), which is defined as a form of social organization in which information generation, processing and transmission become the fundamental sources of productivity and power (*Castells,* 1996).

Despite policy progress, 85 times more is still spent on physical infrastructural projects in the EU, than on innovation. This is a more striking feature in the CEECs, where the infrastructural investments will remain of utmost importance for years, something that might have disadvantageous consequences. Expenditure on education as a share of GDP is more than 30 percent lower in the new member states than in the EU-15, and expenditure on R&D more than 5-6 times higher in the EU-15 than in the Visegrad Countries (*Lackenbauer,* 2004).

Until the early 1990s, innovation and technology policy was oriented towards the national growth target. Spatial implications existed only rarely, in relation to the geographical distribution of public support. In the era of the knowledge-based economy, innovation (as one of the primary sources of economic activity) is no longer limited to technological innovations only, but it is also linked to systemic and network approaches that emphasize the importance of spatial proximity and regionally organized production (*Koschatzky,* 2003). Recent research on innovation systems focuses not only on the technological and socio-economic dimension of innovation, but also on the spatial aspects of innovation-related interactions (*Cooke* et al. 1998). The significance of space in innovation is indicated by empirical research showing that the *production of new knowledge and innovation has a predominant tendency to concentrate and cluster spatially, almost exclusively in urban agglomeration with stronger research university basis*. Spatial concentrations in innovation are more significant than those in manufacturing (*Varga – Szerb,* 2002).

The research on innovation theory carried out in the 1990s aimed at finding a close correlation between regional development and technological change, and the relations with regional innovation potential (*Cooke* et al. 1998; *Tödtling,* 1999). For generation of competitiveness in regions, it is necessary that knowledge and innovation capacity can be transferred in a broad circle. For backward regions, the utilisation of the new economic possibilities offered by the information society can be a breakout point, thanks to increasing innovation capacities. Both research and development (R&D) and high-tech industrial activities are highly concentrated in the core regions of the EU. This reflects wide regional differences in access to knowledge and the ability to exploit it. Unless differences can be narrowed, it will be difficult to achieve the Lisbon strategy objective entailing the EU's becoming the most dynamic knowledge-based economy in the world. Answering this challenge, the EU is assuming that R&D and innovation have to be embedded in specific regional contexts (*Koschatzky,* 2003).

The reality is that economies of less-favoured regions suffer from being isolated from the best international R&D networks and centres. SMEs in these regions, in particular, have difficulties in accessing the latest technological developments. This feature appears more striking in the case of the new member states of East-Central Europe, in which these disparities are not only greater but also very much influenced by the socio-economic transformation of the former communist countries during the 1990s. The transition to a market economy in the CEECs has had a strong impact on both the enterprise sector and the innovation performance of the countries. The restructuring of the enterprise sector has been led by foreign direct investment, which created a dual economy situation of highly pro ductive foreign enterprises on the one hand, and domestic firms with less potential to in-novate or competes on the other. The potential for their catching up based on new technologies is restricted severely by weak demand for R&D on the part of enterprises at the beginning of the transition. The early years of transformation were also characterised by a decline in research infrastructure and a mismatch of national innovations systems. Thus, innovation cannot be examined independently from the performance of the transition and post-transition economies as a whole (*Inzelt,* 1998).

Most of the countries in the Carpathian area (except Austria), like other CEECs, went through economic transformation from the centrally planned economic system to the market-led system, experiencing heavy losses in R&D expenditure. During the communist era, research and technological development was given a high political priority, particularly in certain special industrial sectors. R&D activities were mainly carried out in public industrial research centres. Although the activities of these research centres were dedicated to the support of the development in specific industrial branches, they resembled most 'Fordist' innovation systems, in that they had little interaction with industry. During the transition, R&D activities have diminished significantly on account of both public and private funding for R&D having been reduced drastically. The number of people employed in the sector decreased, following the halving of the number of R&D units. The dramatic decline in markets and restructuring of large firms that were the main customers for R&D led to a sharp decline in business R&D expenditure (BERD). In the CEECs the past decade has brought, not only the termination of applied research in large companies, but also a substantial decline in domestic solvent demand for modern technology applicable in production. This process was compounded not only by the closure of the large industrial R&D institutes, but also by the restructuring of the main profile of these institutes, as many of them sought out new sources of revenue in short-term services, rather than in long-term research projects. Nevertheless, some sur-veys indicate that the innovative capability of the Carpathian area's economies has been weakened to a

lesser extent than has the ability of enterprises to utilize innovation effectively (*Inzelt,* 2002).

Innovation and technology transfer depend greatly on the willingness of companies to innovate – something, that can be measured by reference to the shares of innovative companies and of innovation expenditure in sales revenue. There is a close correlation between innovative efforts and the income-generating capabilities of companies and the innovation performance of firm's determined primarily by the efficiency of their own R&D activities (*Dőry,* 2000). The share of BERD is lower than the EU average, but certain countries in the Carpathian area (Austria, Czech Rep, Hungary, Poland) still have an advantage regarding its BERD relative to GDP, in comparison with Portugal and Greece.

The restructuring of the enterprise sector in the transition period was led by foreign direct investment. This created a dual-economy situation of highly productive and more innovative larger-sized foreign-owned enterprises on the one hand, and domestic firms with lower financial ability to innovate struggling to remain competitive on the other. The attracting of high-tech FDI in firms could have been expected to increase. The dual economic character is clearly indicated by the high share of multinational companies in the national exports.

The dramatic decline in markets and restructuring of large firms that were the main customers for R&D led to a sharp *decline in business R&D expenditure (BERD)* in all of the CEECs. The 1990s' decade brought not only the termination of applied research in large companies, but also a substantial decline in domestic solvent demand for activities of this research. This process was compounded not only by the closure of the large industrial R&D institutes, but also by the restructuring of the main profile of these institutes, as many of them sought out new sources of revenue in short-term services, rather than in long-term research projects (*Table 38*).

These trends are illustrated by fluctuations in R&D expenditure throughout the transition period, showing a sharp decline until 1996. The figure on R&D expenditure as a percentage of regional GDP is one of the most reliable elements of appraisal. The highest level of *R&D expenditure relative to GDP* was achieved in most of these countries in the late 1980s and early 1990s with the lowest rate being reached in the mid or the late 1990s. Since the millennium, R&D expenditure has stabilized and started to increase in the Carpathian countries. Taking the Austrian (2.23%) figure in 2004 as a benchmark the Czech Republic and Hungary reached the highest grade, 1.26 and 0.9 respectively. Poland and Slovakia are in middle rank position with 0.56 and 0.51 respectively. As we do not have figure for Serbia and Ukraine Romania with 0.39% performed the lowest expenditure relative to the GDP. The expenditure of the relative well performing Carpathian (Czech Rep., Hungary) countries as compared to GDP is about half and slightly more of the EU-15 average level, and is similar to levels in the cohesion

Table 38

Innovation performance in the selected countries of the Carpathian area

Country	No. of publications in universities and R&D institutes, 2001		No. of European patents per 1 million inhabitant, 2000	Gross R&D expenditure as a percentage of GDP, 2002	Business R&D expenditure as a percentage of GDP, 2002	Share of government in R&D funding, %, 2002	Share of business sector in R&D funding, %, 2002	Share of foreign-owned enterprises within total BERD, %, 2001
	per 1 million USD	per 1 million inhabitants						
USA	594	52.8	309.1	2.67	1.9	8.8	68.2	15.0
OECD	406	–	83.0	2.26	1.5	11.0	63.9	–
EU15	460	–	126.0	1.93	1.2	13.0	64.4	–
Austria	441	67.2	158.9	1.93	1.1	6.4	63.6	–
Czech Republic	195	68.1	22.2	1.30	0.8	23.0	53.7	45.3
Poland	117	63.8	26.4	0.59	0.2	45.0	21.4	4.6
Hungary	195	107.2	29.8	1.02	0.4	33.0	35.5	79.0

Source: OECD STI Outlook, 2004.

countries. Nevertheless, their figure was lower than the figures for Austria (2.23%) and Slovenia (1.78%), which are above or very close to the EU average.

R&D investment relative to GDP funded by the business sector – except in Austria and the Czech Republic – was low in the Carpathian area by international comparison. The highest proportion in business R&D expenditure (BERD) can be found in Austria and Czech Republic (2/3 of the total R&D expenditure), while the extremely low figure available for Poland (0.28%, while Hungarian, Slovakian and Romanian figure ranging between 0.4 and 0.53%. First of all BERD relative to GDP demonstrates business activities in generation of applied knowledge. In developed countries, the business sector dominates as a performer of R&D. The percentage of GERD performed by the business sector has reached 70% in the OECD countries, exceeding the 60% noted in the EU-15 (*Table 38*).

15.3 The regional structure of R&D

Over the transition period, there has been a rapid increase in the number of innovation-oriented small and medium size enterprises, which are less concentrated spatially and heavier needs are not necessarily concerned with high-tech industry developments. These new demands and the change of innovation paradigm, place greater emphasis on the establishment of a decentralised institutional network promoting knowledge and technology transfer. Needed in addition to the revitalisation of the traditional network of R & D institutions is a multi-polar innovation system with more actors, in which distribution-oriented 'knowledge bases' co-operate in a network. The types of resources involved in the field of innovation can include specific assets that are only available in a certain place and these assets usually depend on spatial proximity and concentration. The regional level is particularly appropriate for mobilizing a critical mass of partners able both to promote innovation and to implement it effectively at grass-roots level (*Cooke* et al. 1998). Synergies, or an innovative surplus, can arise from the shared knowledge of the local economic-social-cultural milieu, that promotes network linkages (*Tödtling,* 1994).

Emphasis is placed on territorial disparities as regards scientific and technological development in Hungary. What is clearly seen from other European countries is that R&D and innovation activities are highly concentrated in core regions. In the European Union, just eight regions account for over a quarter of R&D expenditure, while thirty are responsible for half. As might be expected, there is a similar concentration of patents, as half of all high-tech patents are being made granted in just thirteen core regions (European Commission 2004). Location factors of innovation processes have largely an agglom-eration-driven character, varying concerning existing spatial economic structures. The presence of a ‘criti-

cal mass' of agglomeration in a metropolitan area is required if substantial economic effects of academic research are to be expected (*Varga,* 2003). While in centralized economies, market-oriented industrial R&D activities are mainly confined to a few urban agglomerations, other countries are characterised by a more decentralised distribution of R&D activities. *In the case of the Carpathian countries, the R&D employment and even more expenditure heavily concentrated into the central/capital city regions* (*Table 39*). Countries – irrespective of their spatial characteristics – have gained technological competitiveness in certain fields or are paying the price of still-existing regional inequalities. There are wide disparities be-tween regions in terms of BERD, of greatest relevance to the assessing of the contribution made by innovative efforts to achieve competitiveness. The question is rather whether economies can succeed in flexibly adjusting their spatial distribution of innovation activities to the challenges that global technological competition poses.

There are differences in individual concepts featured in literature, when it comes to the explanation of innovation and regional development. The new growth theory and spillover studies emphasize that a 'critical mass' of agglomeration in metropolitan areas is required to concentrate re-sources (proper funding, efficient research units and synergies) among institutions in R&D fields. According to the literature, large cities with 3 million inhabitants are able to provide infrastructure, highly-skilled labour, and technology & business services for efficient R&D (*Varga,* 2002). Other interpretations (such as the network and milieu-oriented theory), emphasize the importance of development of decentralized regional innovation networks and clusters. However, it is difficult to decide the seemingly rhetorical question of whether a highly- or less-concentrated dis-tribution of R&D potentials or to put it an-other way, the centralised or decentralized systems are more efficient. It is rather more important how economies can succeeding flexibly adjusting their spatial breakdown of innovation activities to the challenges of global technological competition. In the case for Hungary, it is obvious that the Budapest agglomeration can provide a certain critical mass of economies of scale in the concentration of R&D activities, and its pre-dominant role can not be questioned. Nevertheless, if preference is given to the development of competitive regions and di-minishing disparities, and when the national innovation centre is unable to support the needs as regards technological change in the regions and to establish a localized technology paradigm, a shift towards the preference for regionally-oriented regional policy measures is needed (*Koschatzky,* 2003) (*Table 39*).

The figure on R&D expenditure and its territorial distribution are one of the most reliable elements of appraisal. There is large *fluctuation in the absolute size of the R&D expenditure varying by country to country and regions to regions.*

Table 39

Spatial concentration of R&D in selected countries (at least half of the R&D employees can be found in the following agglomerations)

USA 1995	Germany 1997	Italy 1995	UK 1995	France 1995	Czech Republic 1995	Hungary 2000
New Jersey, Essex 9%	Munich 12%	Milano	London	Paris	Prague 32%	Central
Boston 8%	Stuttgart 12%	(Lombardy)	(South East)	(Île de France)	Sredny Cechy	Hungary
Los Angeles 7%	Darmsatdt 9%	33%	41%	48%	28%	64%
Philadelphia 6%	Rhine-Neckar 6%	Turin	East England	Rhône-Alpes		(incl. Budapest
Detroit 4%	Berlin 4%	(Piemonte)	11%	11%		59%)
Chicago 5%	Düsseldorf 4%	24%				
New York 4%	Brunswick 3%	Rome (Lazio)				
San José 3%	Cologne 3%	10%				
Washington 3%						
9 regions	8 regions	3 regions	2 regions	2 regions	2 regions	1 region
49%	53%	67%	52%	59%	60%	64%

Source: Koshatzky (2003) and the author's calculations.

The shift from the centrally-planned to the market economy, and especially the transformation of enterprises, had a dramatic impact, not only on R&D infra-structure, but also on innovation finance, as clearly measurable by the cycles of R&D expendi- ture. R&D is funded by various sources. The major division exists between the public and private funding. OECD classifications use four funding sector categories: governmental, business, non-profit and foreign. The govern-ment sector becomes the leading fin-ancier of R&D in those countries in which industry has been weakened by economic transformation; the role of other sectors is salient. It can be observed that the funding role of the Hungarian government sector has increased since 1990, although expenditure has decreased in real terms (*Inzelt,* 2002).

In terms of the spatial breakdown of the R&D expenditure within the Carpathian area large disparities can be observed between the most and the least developed countries, respectively Austria and Romania (Ukraine and Serbia ex-cluded). Data shown more than 30 times differences in the absolute figure on R&D expenditure between Austria and Romania. This development gap even more striking in the case of the most developed Wien metropolitan region and the worst preforming Świętokrzyskie region (546 times difference) (*Table 40*).

In terms of the *spatial breakdown of the R&D expenditure within the countries of the Carpathia Area* we can see a similar geographical distribution trend as is observed in the case of employees. The predominance of the capital city regions, indicating a strong concentration of innovation resources in the capital city, are very high in the case of those countries where the Carpathian area incorporates the capital city regions. The larges concentration can be found in the Hungarian and the Romanian case, with 64 and 59% GERD concentration respectively. In the case of Slovakia and Austria the GERD concentration into the capital city region is just below 50%. In the Polish or the Czech Carpathian areas have only shallower concentration in R&D expenditure. The Polish Carpathian area characterised by almost the far largest the intraregional differences. This gap pictures absolute domination of the Warsaw area over the rest of Poland although it is outside our case area. Małopolskie owes its second position to R&D indices – Kraków is the second biggest scientific and university center after Warsaw. It is the location to for biggest research centers established by transnational foreign companies (ABB, Motorola, Delphi). Although the next five regions are ahead of Małopolskie in regards to ICT firms development – it would be a misleading conclusion that Kraków R&D complex weakly translates into ICT development. Firstly because western part of Małopolskie contains some of the best Polish powiats in this respect and secondly – so many ICT firms from Silesia region (Śląskie) are linked to Kraków R&D. The worst regions are located, firstly, on Poland's eastern border, including Podkarpackie and, secondly in central-eastern Poland – Świętokrzyskie voivodship which was the last in all R&D indices.

Table 40

Territorial distribution of R&D expenditure figures in the Carpathian regions (2004)

Region/country	R&D expenditure/ million EUR	Percentage of the country's total, %	Share of BERD in the total GERD, %
Austria	*5250*	*100.0*	*68*
Burgenland	29	0.6	86
Niederösterreich	327	6.2	93
Wien	2184	41.6	58
Czech Republic	*1100*	*100.0*	*64*
Jihovýchod	141	12.8	56
Střední Morava	58	5.3	83
Moravskoslezsko	69	6.3	80
Hungary	*721*	*100.0*	*41*
Közép-Magyarország	464	64.0	46
Közép-Dunántúl	43	6.0	47
Nyugat-Dunántúl	33	4.5	52
Észak-Magyarország	19	2.6	38
Észak-Alföld	59	8.1	43
Dél-Alföld	47	6.6	23
Poland	*1139*	*100.0*	*29*
Małopolskie	143	12.5	25
Śląskie	89	7.8	32
Podkarpackie	23	2.0	75
Świętokrzyskie	4	0.36	n.a.
Romania	*235*	*100.0*	*55*
Nord-Vest	8	3.4	53
Centru	11	4.9	95
Nord-est	13	5.3	58
Sud-Est	8	3.2	70
Sud – Muntenia	33	14.1	98
Bucureşti-Ilfov	138	58.7	42
Sud-Vest Oltenia	13	5.7	38
Vest	11	4.8	55
Slovakia	*174*	*100.0*	*49*
Bratislavský kraj	86	49.3	29
Západné Slovensko	47	26.7	81
Stredné Slovensko	21	12.2	69
Východné Slovensko	21	11.8	43

Source: Eurostat.

In Hungary only the central region (including Budapest) is above the national average (1.8). This figure for Budapest exceeds 2%. This strong agglomeration of R&D activities into the capital city can be explained partly by the spatially-concentrated character of innovation in scale economies and partly by the long-standing tradition of scientific life in Budapest. Following the central region, the next largest figures can be found in the Great Plains regions, which incorporate the largest traditional university centres (their shares from total GERD (8.1–6.6%) is markedly larger than in the Transdanubian regions. In these latter regions, R&D potential is distributed more evenly among research bases, including a higher number of business units among those. This difference lays in the origins of funding. While public spending dominates in the eastern regions, in the more-developed western regions BERD is markedly higher.

In Romania and similarly in Slovakia one particular provincial region follows the large metropolitan concentration of the capital cities. In Romania Sud Muntenia characterised by the strong enterprise-led innovation activities in the chemical sector can be the right explanation for its almost 15% of GERD concentration, of which BERD is accounted for 98%. In the case of Slovakia the Zapadné region absorbs more than the quarter of the total GERD of which 81% is performed by the business sector, and quite a large extent by multinationals in the automotive sector relocated their own R&D units into the Carpathian area.

While public spending dominates in certain countries (Poland, Hungary, and Slovakia) and the larger metropolitan regions, concentrating large number of public research units in another's (Austria, Czech Republic) business sector R&D expenditure is markedly higher. This is also the case in their regions characterised by strong industrial agglomerations and in-house R&D units of their companies.

In studying the territorial structure of innovation characterized by the main R&D indicators during the transition period, we can note the dominance of a dual effect, namely decreasing demand and declining financial resources for R&D. Research and development fell into crisis in the early 1990s as a consequence of a decline in government spending on the sector, and particularly be-cause of the disintegration of large companies which had conducted their own research activities (*Papanek* et al. 1999). The difficulties of the sector reflected in the changes in the number of employees. The *number of employees in R&D institutions* peaked in late 1980s and then declined sharply to have more than halved by the mid-1990s.

The ratio of *research employment to the active population* was the highest in Austria (1.89) following by Hungary (1.19) and the Czech Republic (1.18). Contrast to these countries the lowest figures is available for Romania (0.4) and Poland (0.75). The regional distribution of active labour force in the R&D sector shows the sectoral characteristics of a particular region. Regions with strong metropolitan concentrations and well-developed innovation infrastructure have higher

representation of R&D employees, than those peripheral (rural) regions without strong university knowledge basis. The highest figure allocated for the Wien (4.12), Bratistlavsky (3.18), the Central-Hungarian (2.12) and the Bucureşti (1.99) regions.

The lowest figures can be found in the cases of the most peripheral regions; most of them located in Romania (Sud East, Nord East, and Nord Vest) and in Poland (Świętokrzyskie), and their figures were below 0.2%. The Eastern Czech regions are characterised by a relatively higher percentage of R&D employment in percentage of active population. The ratio of research staff relative to the active population in Hungary reduced from 0.94 to 0.55% between 1988 and 1996, and has slowly risen back to 0.69% (by 2000) and increased further to 1.19 in 2004. Except the higher ranks of the Great Plain regions (0.9–1.06) the rest of the Hungarian regions of the Carpathian areas perform figures around 0.5%. The Great Plains regions of the largest university centres (South Great Plains, North Great Plains). The forerunner counties of Western Transdanubia lag behind in these terms and, paradoxically, the Northeastern region, the one most seriously hit by the structural crisis, has more R&D employees due to the presence of the originally engineering-based Miskolc University and research units in chemical industry.

As regards the regional distribution of innovation activities, a spatial contradiction exists. Taking the Hungarian example the North-west Hungary is characterised by a high level of industrial production, GDP per capita and business-oriented innovation, but at the same time university-, based R&D activities are rather weak. Its basic R&D indicators are not only below the national average, but they are shallow even in comparison with the less-developed eastern regions (*Dőry,* 2000). Paradoxically West Transdanubian region, while in the vanguard of economic development through the attraction of FDI, has weaker than expected R&D performance (especially in terms of input indicators) and institutional framework for research (lack of traditional universities). Although it is true that the strong FDI presence has not been accompanied by statistically-significant R&D activities in Nort-west Hungary, the industrial and innovative traditions, the concentration of multinationals into the high-technology sectors (especially the automotive industry) and the formation of one of the first high-tech clusters in Hungary (Pannon Automotive Cluster) have increased the innovation potential of the region. Local initiatives with governmental support have expanded the region's higher educational capacity in recent years, with a view to its catching up in the field of research and prospering co-operation with industry (*Grosz*, 2003).

Besides the statistically well-established *input indicators*, less reliable data is available in the f ield of *R&D outputs* (e.g. SMEs innovating in-house, SMEs' innovation expenditure, sales of new-to-market products, new capital raised/GDP, HR in S&T). The output indicators demonstrate the contribution of research

achievement to the competitiveness of the economy. The number of patent applications and the *available human resources in Science & Technology*. Innovation-oriented economy cannot be developed without the required human resources, i.e. the supply of properly trained employees for the companies. The present industries in the region are generally characterized by the lack of properly trained employees, and consider vocational training far from adequate level regarding both its quality and content. The regional supply of training programmes cannot meet the demands of the labour market, as the vocational training system does not follow the changes in the economy.

Human resources in S&T as percentage of economically active population are one of the key indicators of human capital supply and potential of a particular region. The largest share of S&T employees can be found in the metropolitan regions where large agglomeration and concentrated knowledge basis could provide the appropriate pool of highly skilled labour and S&T graduates. The Bratislava, Wien and the Central Hungary regions provide the largest share of S&T employees, 47.6%, 46.5% and 41.7% respectively (this figure for Budapest is slightly above 50%!). The lowest figures are available for the Romanian peripheral regions (Nord Est, Sud Muntania and Sud Est) accounted around 15% and below. The average figure for the rest of the regions of Carpathian area is about 25%

Within the Carpathian area only the *Budapest agglomeration* could provide 2.7 million inhabitants, appropriate infrastructure to become a real knowledge pool for the Carpathian region. In the case for Hungary, it is obvious that the Budapest agglomeration can provide a certain critical mass of economies of scale in the concentration of R&D activities, and its pre-dominant role can not be questioned The traditional predomi-nance of Budapest in the economy has not diminished. Indeed, it has grown consider-ably since the change in regime. During the transition, Hungarian growth has been agglomeration-driven. The country's very high agglomeration-elasticity of growth is embodied by the dominant role of the capital city as the centre of innovation. Budapest is characterised by good infrastructural links, massive inflows of FDI and by a great number of joint ventures, which act as connections to international networks (*Bachtler* et al. 1999). Budapest has attracted tertiary activities, including innovation services. During the transition, the capital city was not only able to retain its advantage over the rest of the country, but in fact further increased it. Budapest became a bridgehead of Hungarian innovation, which overwhelming dominance in the innovation field is shown clearly by the main innovation indicators. There are several arguments concerning the predominant position Budapest holds within S&T. The key role of Budapest as the centre of innovation in economic transformation was rooted in the traditionally- centralized (path-dependent) structure of Hungarian science. It is based on its disproportionate size of agglomeration and reinforced by the lack of the

autonomous and regionally embedded innovation centres outside Budapest. The geographical structure is a barrier, as innovation activities are highly concentrated: large gaps occur between Budapest and the countryside, between the Budapest–Vienna axis and the regions lagging behind, and between the largest knowledge centres and the remaining settlements.

15.4 Conclusion

Because of the goals of the Lisbon strategy, defined in 2000, the target shares of company sector in overall expenditures on R&D were set to 66% during the Barcelona summit in 2002. Following the yet unsatisfactory outputs of the *Lisbon agenda*, a new initiative was formed in 2005, bearing the name Lisbon partnership for growth and employment. In order to increase the efficiency of the so-far growth supporting efforts in the EU three priority areas of support were set, encompassing also knowledge and innovations for growth. Lisbon national reform programmes were created at the national level and the Lisbon program of the Communities was prepared at the EU level; all of them integrated for the first time into the common research and innovation policy (*Kadeřábková,* 2006).

Innovation is crucial to the integration and modernization process in the CEECs as well as in the Carpathian area. One of the biggest systemic failures of the transformation economies of East Central Europe was the mismatch between the different components of the innovation system, result-ing in a rapid decline in government support and industrial research during the transition period. The failure of the centrally planned model of innovation had been dissolved and the economic environment during the transition did not favour the structural re-organization of the system. The modernization of the NIS has created a good framework for the development of co-operation between the different spheres of innovation, but still fails to handle the problems of regional inequalities. While during the transition, spatial development was largely determined by FDI in manufacturing, in the post-transition period this main factor was augmented by new directions in innovation as an important factor differentiating economic space.

Although the capital city (metropolitan) regions of the Carpathian area, are undisputed leaders in many aspects of innovation, the rest of the Carpathian area is not its periphery. The picture is much more complicated than simple core-periphery model. The R&D activity indicators offer for other regions a chance to succeed. It seems that especially Niederösterreich, Małopolskie, Jihovychod, North Great Plain, Zapadne Slonvensko and Vest Romania have a potential for knowledge-based development. According to the big urban agglomerations in the CEECs – the metropolises are leaders of the economic transformations at the expense of the surrounding regions. There are positive spread effects in the radius

of 30–50 kilometres but the more remote areas are deprived of the most active and qualified employees. This notion finds confirmation in what was presented above at micro-regional level, where good accessibility to education in metropolitan zones is reflected in the knowledge based economic development and R&D activities whereas in the more remote areas this relationship fades.

The future success of the Carpathian area depends largely on regionally based, knowledge-oriented economies, perhaps the most promising way to achieve modernization and catch up. The preconditions for the creation of this are largely jeopardised by the shal-lower innovation potential of the Carpathian regions outside the metropolitan regions, resulting in large geographical differences. Development of regional innovation policy will be of decisive importance in the modernization of the spatial structure of the Carpathian area, the improvement of regional competitiveness and the foster-ing of re-industrialization. The construction of a regional institutional system capable of developing the technological level of the regions is a prerequisite for integration into the globally- and regionally- organized knowledge economy.

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