Hungary in Maps

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Budapest, 2009

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Cover Design: Keresztesi, Z., Kovács, A.

Technical Staff: Laczkó, M., Poór, I.

Printed in Hungary by Mackensen Kft.

Publisher: Schweitzer, Ferenc director
Hungarian Academy of Sciences
Geographical Research Institute
www.mtafki.hu

This publication was supported by
HUNGARIAN ACADEMY OF SCIENCES
PAKS NUCLEAR POWER PLANT

ISBN 978-963-9545-25-0

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FOREWORD

Today's globalised realities make, on the one hand, acquainting oneself with foreign climes and on the other, shaping one's own image abroad, indispensible activities. These days, distant regions of the earth are now perceived to be closer and people located in far away locations are becoming interested in Hungary and its inhabitants. In the parallel national journeys of self-awareness and self-promotion, geography has played a key role since ancient times. Consequently, Hungarian geography and cartography have always played an eminent part not only in the development of knowledge of the country and its nation but – through publications in foreign languages – in shaping the image of Hungary abroad.

The time is now upon us to offer an up-to-date, digestible, English language summary of the country's politics, its society and economy, twenty years after the change in political system. A series of regional atlases launched on the initiative of the Presidency of the Hungarian Academy of Sciences (HAS) – until now represented by the publications *South Eastern Europe in Maps* (2005, 2007) and *Ukraine in Maps* (2008) – provide an appropriate framework for "*Hungary in Maps*" which is conceived as a precursor to the new edition of the National Atlas of Hungary, to be produced under the coordination of the Geographical Research Institute HAS.

This publication seeks to inform and educate about Hungary – a state with over 1100 years of history; a comparatively small country with a population of ten million and a moderate supply of raw materials, located in the south-eastern corner of Central Europe, and more precisely in the Carpathian Basin – with the help of more than 220 maps and tables. This is the land where air flows arriving from the East European Plain, Atlantic Ocean and Mediterranean Sea converge but is has also served as an arena for the mixing of various people and cultural influences during times of peace, and borne witness to their bitter clashes during wars. 90% of the 13 to 14 million Hungarians found across the globe are citizens of only eight countries sharing the territory of the Carpathian Basin. Even though out of any one hundred Europeans only two are Hungarian, the historical and cultural significance of this nation at the centre of Europe has always exceeded its size. Even during the socialist era, the country appeared on the European radar, never more so than at the time of the revolution in October 1956, and later in 1989 when Hungary, playing an important role in lifting the Iron Curtain, greatly contributed to the dismantling of the Berlin wall, German unification and the collapse of the Eastern Bloc. Logically enough it was among the first of the post-communist countries to join NATO and the EU. Hungary is deserved of close attention not only in the field of politics, but also that of culture and learning. Franz Liszt, Ernő Dohnányi, Béla Bartók and Zoltán Kodály can take their rightful place amongst the musical greats of the world. Of the Nobel Prize laureates (e.g., Albert Szent-Györgyi, György Békésy, Eugene Wigner, Dennis Gábor, George Andrew Oláh and Imre Kertész) 13 were born in Hungary, and 8 of them born to Hungarian parents. Thanks to its international reputation, cultural heritage and nature, the country has become one of the popular destinations for international tourism over the past two decades.

On the 20th anniversary of regime change, 10th anniversary of acquiring NATO membership and the 5th of our EU accession, the culmination of diverse foreign interest in the country has precipitated the publication of this richly illustrated atlas. Benefiting from explanatory text, it seeks to introduce the reader to Hungary's natural environment, society and economy, and the changes therein that have taken place over the past two decades.

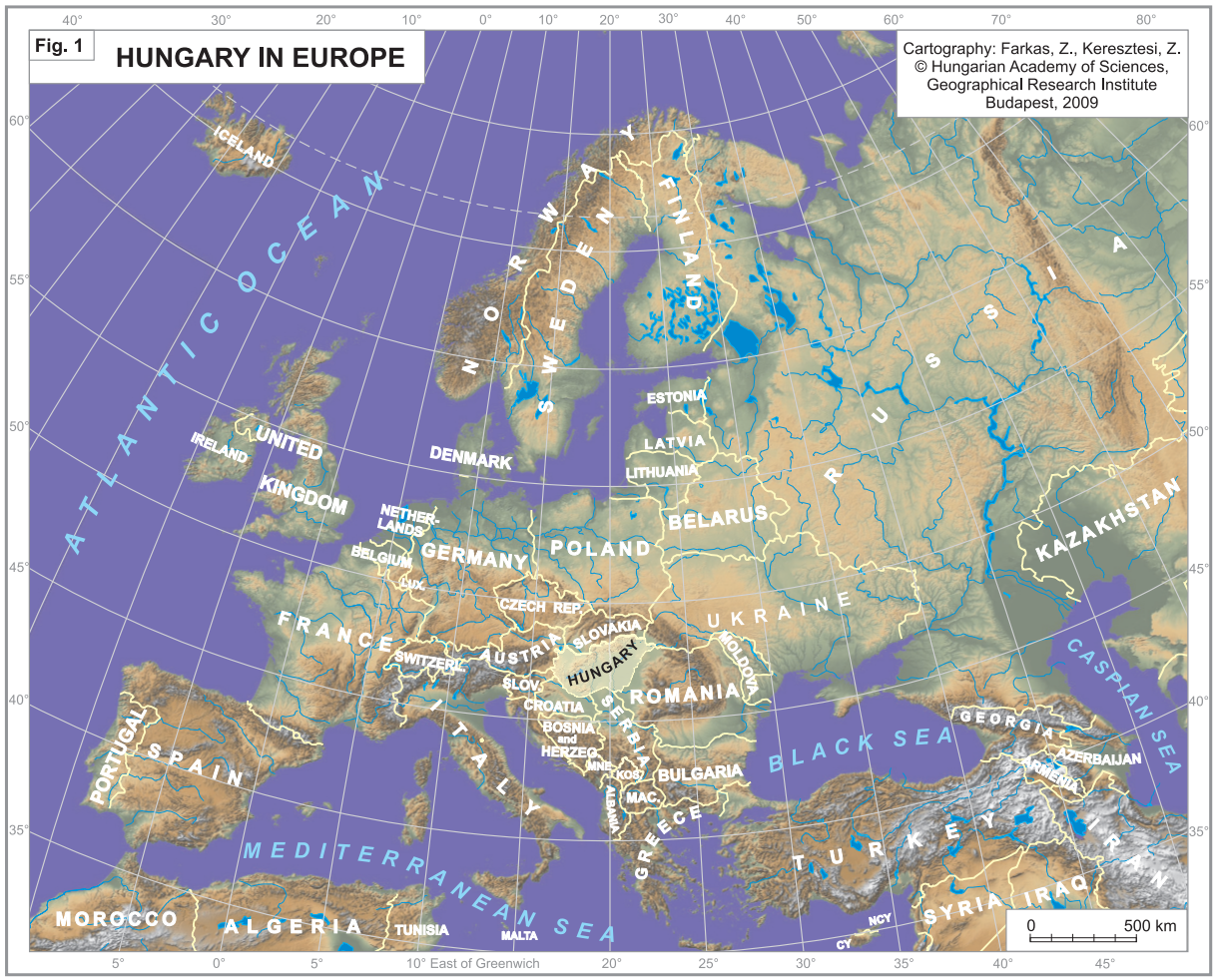
Tamás Németh
Secretary General of the HAS

HUNGARY IN THE WORLD
(Geographical Location and Geopolitical Situation)

Geographical Setting

Hungary is located in the Carpathian (Pannonian, or Central Danubian) Basin, in the south-eastern part of Central Europe between 16°05′ and 22°58′ of eastern longitude, and 45°48′ and 48°35′ of northern latitude, almost equidistant between the equator and the North Pole *(Figure 1)*. Its territory spans 528 km from the west to the east, and 268 km from the north to the south. Geographical extremes are the village of Garbolc in the east, where the sun rises 27 minutes earlier than over Felsőszölnök in the west; the Nagy-Milic mountain peak in the north and the village of Kásád near the River Dráva in the south.

Hungary is a landlocked country. From Budapest the nearest seaport is Rijeka on the Adriatic Sea (Hungarian territory until 1918 and also known as Fiume; 420 km by air). Much further from the Hungarian capital, with a distance of 755 km and 820 km respectively (by air) are the coastlines of the Baltic Sea and Black Sea. Hungary's climate is however largely influenced by the westerly winds arriving from the Atlantic Ocean, the coastline of which is a mean distance of 1000–1500 km from Hungary. Due to its central location the country's territory is a genuine arena of oceanic, continental and Mediterranean



air masses. Hungary is considered to be a lowland country. 83% of its territory is situated below 200 m, while only 2% is higher than 400 m above sea level, the topography providing a favourable opportunity for agriculture and the development of the transport system.

State Territory and Boundaries

An independent state named 'Hungary' first appeared on the map of Europe following the Conquest of the Hungarian tribes in the Carpathian Basin, under the leadership of chieftain Árpád in 895. With the crowning of his grandson, Stephen I in 1000, the Hungarian Principality turned into the Kingdom of Hungary, which existed with interruptions until 1946. From the early 10th century, the whole territory of the Carpathian Basin (around 300 thousand km²) became part of Hungary. Due to personal unions (with Croatia (1102–1527), Poland (1370–1384), and Croatia-Slavonia (1873–1918) and annexations, the territory under the rule of the Hungarian Crown reached its peaks between 1370 and 1382 (577 thousand km² during the rule of Louis I, the Great) and between 1485 and 1490 (482 thousand km², under Matthias I, known as Corvinus). During the Ottoman (Turkish) supremacy, the territory of the Hungarian state was divided into two parts: the Habsburg Kingdom of Hungary and the Principality of Transylvania, the latter ensuring the survival of semi-independent Hungarian statehood during the 16–17th centuries. Following the gradual reintegration of some historical provinces (e.g. Banat 1741, 1860; Transylvania 1848, 1867) and the revival of the Hungaro-Croatian personal union (1873), the territory under the authority of the Hungarian Crown began to approach its medieval one (about 320–330 thousand km²). The capital returned from Pozsony (or Pressburg, today Bratislava) to Buda in 1848 (since 1873 Budapest).

The present territorial borders of Hungary were essentially formed after the dissolution of the Austro-Hungarian Monarchy and the subsequent partitioning of the historical territory of the Hungarian state by the Treaty of Trianon (Versailles, 1920). Between 1938 and 1944, predominantly during World War II, nearly 79 thousand km² of land were temporarily reannexed to Hungary by the Axis powers (which included the majority of the Hungarian ethnic territories detached in 1920).

Following World War II, the Treaty of Paris (1947) unwound the Hungarian territorial revisions of 1938–1941, and even three settlements in the region of Bratislava were annexed from Hungary to Czechoslovakia. With this act Hungary's territory decreased to its present 93,030 km². The total length of its national borders amounts 2,246 km, shared by the following countries: Slovakia – 679, Ukraine – 137, Romania – 453, Serbia – 164, Croatia – 355, Slovenia – 102 and Austria – 356.

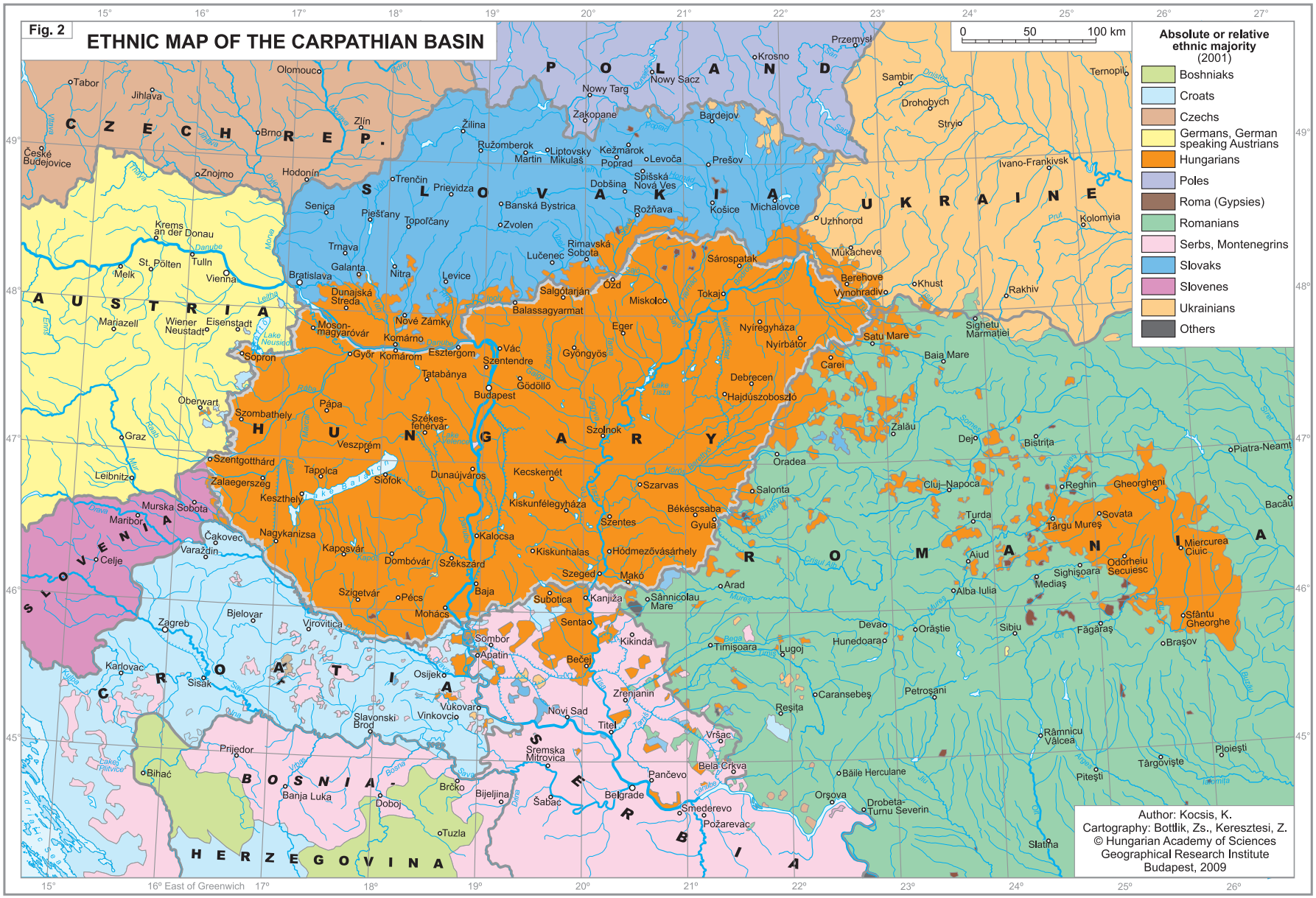
The compactness of the country's territory (expressed in km² of territory per one km of border) is an average of 41.5 km²/border km compared with Romania's 74.4 and Croatia's 11.2. Hungary's geopolitical situation changed favourably following the dissolution of its neighbouring federal states (between 1991–1993, involving Yugoslavia, the USSR and Czechoslovakia) into smaller, new nation-states, resulting in a radical transformation in the old alliance system.

Ethnic Territory and Boundaries

Due to the peace treaties of 1920 and 1947, the current national borders do not necessarily coincide with the area inhabited by the ethnic Hungarians *(Figure 2, Table 1).* As a result, over

Fig. 2

ETHNIC MAP OF THE CARPATHIAN BASIN



one million ethnic Hungarians live in the border zones of Slovakia, Romania, Serbia and Ukraine and ever since 1920 their presence has imposed a serious burden on the internal and foreign affairs of the affected neighbouring countries, invoking fears of Hungarian irredentism (which were temporarily realised between 1938 and 1944). Ever since 1920 up to the present day, the 'Hungarian question' casts a shadow over interethnic and interstate relations, and the extent of the difficulties correspond with the size of the Hungarian minority living in the given country. Good relations between Hungary and Austria, Slovenia and Croatia are contributed to by close historical, cultural and economical relations, along with a very similar number of each nation's minorities on both sides of the border and an almost perfect correlation between state and ethnic borders (*Table 2)*. These facts serve to notably increase the political stability of their joint borders. By contrast, the events of the two world wars, the subsequent territorial and ethnic annexations, and the sheer numbers and situation of Hungarian minorities in the joint border regions still significantly trouble relations between Hungary and Slovakia, Romania and Serbia, keeping alive these nations' fears of Hungarian territorial revision.

Table 1. ***Ethnic stability of the state borders in the Carpathian Basin (2008)***

Border section	State border total		Out of this			
			Ethnic boundary*		Non-ethnic boundary**	
	kms	%	kms	%	kms	%
Hungary–Austria	356	100.0	345	96.9	11	3.1
Hungary–Slovakia	679	100.0	95	14.0	584	86.0
Hungary–Ukraine	137	100.0	7	5.1	130	94.9
Hungary–Romania	453	100.0	244	53.9	209	46.1
Hungary–Serbia	164	100.0	106	64.6	58	35.4
Hungary–Croatia	355	100.0	320	90.1	35	9.9
Hungary–Slovenia	102	100.0	52	51.0	50	49.0

Remarks: *Ethnic boundary: The state border coincides with the ethnic-lingual boundary. **Non-ethnic boundary: The state border does not coincide with the ethnic-lingual boundary. The same ethnic group lives on both sides of the border (dominantly ethnic Hungarians).
Source: Hungarian Central Statistical Office (www.ksh.hu) and calculations of Kocsis, K.

Table 2. ***Ethnic reciprocity in the countries of the Carpathian Basin (2001/2002)***

Minorities	Absolute number	Minorities	Absolute number	Reciprocity ratio
Hungarians in Romania	1,431,807	Romanians in Hungary	7,996	179.0 : 1
Hungarians in Slovakia	520,528	Slovaks in Hungary	17,693	29.4 : 1
Hungarians in Serbia	293,299	Serbs in Hungary	3,816	76.9 : 1
Hungarians in Ukraine	156,600	Ukrainians in Hungary	6,168	25.4 : 1
Hungarians in Croatia	16,595	Croats in Hungary	15,620	1.1 : 1
Hungarians in Slovenia	6,243	Slovenes in Hungary	3,040	2.1 : 1
Hungarians in Burgenland (A)	6,641	Germans in West Hungary	2,831	2.3 : 1

Source: Census data 2001 (A, H, HR, SK, UA), 2002 (RO, SLO, SRB).

Administrative Divisions

Hungary's territory is subdivided into 19 ***counties*** ("megye" in Hungarian, "comitatus" in Latin) and the ***capital*** (Budapest) into NUTS 3 (Nomenclature of Territorial Units for Statistics) level units, which have been grouped together since 1996 into 7 ***regions*** (NUTS 2) for statistical and development purposes *(Figure 3)*. The counties are subdivided into 174 ***microregions*** ("kistérség") as LAU 1 (Local Administrative Unit, former NUTS 4) units, including Budapest as its own microregion. The LAU 2-level is represented by the 3,175 ***local municipalities*** (in-


Fig. 3
ADMINISTRATIVE DIVISIONS
(01.07.2009)
0 20 40 60 km
16° 17° East of Greenwich 18° 19° 20° 21° 22° 23°
48° 47° 46°
BUDAPEST
I.
II.
III.
IV.
V.
VI.
VII.
NÓGRÁD
HEVES
EGER
BORSOD-ABAÚJ-ZEMPLÉN
MISKOLC
SZABOLCS-SZATMÁR-BEREG
NYÍREGYHÁZA
HAJDÚ-BIHAR
DEBRECEN
JÁSZ-NAGYKUN-SZOLNOK
SZOLNOK
KOMÁROM-ESZTERGOM
TATABÁNYA
GYŐR-MOSON-SOPRON
GYŐR
SOPRON
VESZPRÉM
SZÉKESFEHÉRVÁR
VAS
PEST
FEJÉR
KECSKEMÉT
BÁCS-KISKUN
BÉKÉS
BÉKÉSCSABA
ZALA
ZALAEGERSZEG
SOMOGY
KAPOSVÁR
TOLNA
SZEKSZÁRD
BARANYA
PÉCS
CSONGRÁD
SZEGED
Regional centre
GYŐR County seat
SOPRON Town with county rights
Seat of microregion
Aba Seat of microregion without urban status
Boundary of region
Boundary of county
Boundary of statistical microregion
Population number of cities and towns
1,712,000 (Budapest)
200,000 – 250,000
150,000 – 200,000
100,000 – 150,000
50,000 – 100,000
25,000 – 50,000
10,000 – 25,000
5,000 – 10,000
<5,000
Regions
I. Central Hungary
II. Central Transdanubia
III. Western Transdanubia
IV. Southern Transdanubia
V. Northern Hungary
VI. Northern Alföld (Great Plain)
VII. Southern Alföld (Great Plain)
Abbreviations
Dh. = Dunaharaszti
H. = Halásztelek
Szh. =Szigethalom
Szsz.=Szigetszentmiklós
Tö. = Tökől
Cartography: Keresztesi, Z.
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Danube
Lake Balaton
Lake Velence
Lake Fertő
Lake Neusiedl
Tisza
Maros
Mureş
Dráva
Rába
Sió
Zagyva
Hernád
Bodrog
Sajó
Berettyó
Körös
Ipoly
SLOVAKIA
UKRAINE
AUSTRIA
SLOVENIA
CROATIA
SERBIA
ROMANIA

cluding 24 capital districts). Among the localities there are 328 ***urban settlements***, out of which 23 are called '***towns with county rights***' ("megyei jogú város"). The latter (all county seats and towns with at least 50 thousand inhabitants) are not independent administrative units, rather they belong to the territory of the respective county.

The system of Hungarian counties, as substantial administrative units of the country, looks back upon nearly a millennium's history. The function, organisation and territorial division of the counties have profoundly changed since the time of their founder, King Stephen I (975–1038). The main historic prefixes since have caused them to be known as Royal, Nobilary, Civic, then Socialist (Council/Soviet) counties, and since 1990 as the Local Authority County. Following the partitioning of the country in 1920 and many administrative reforms, the number of counties steadily decreased during the first half of the 20th century (1910: 71, 1920: 34, 1930: 25, 1950: 19).

Hungary's Place in the European Pattern of Economic Development

The economies of the post-Communist countries were shattered by the political, economic and social changes that swept through the eastern half of Europe, magnified by the post-1989 disintegration of socialist federal states (the USSR, Yugoslavia and Czechoslovakia) along with the emergence of territorial, ethnic and religious conflicts. The scope and duration of this economic crisis, which was frequently accompanied by rampant inflation, varied from country to country. Owing to the timing of economic restructuring and privatisation, along with the introduction (or the absence) of shock therapy, the trough in both time and extent shifted and was aggravated from west to east. Annual GDP had shrunk (in comparison to the levels of 1989)

Table 3. ***GDP data of selected European countries (2008)***

Country	GDP per capita, USD (based on PPP valuation)	GDP PPP total (billion USD)	Population number (thousand)
Switzerland	42,841	327.0	7,633
Ireland	42,780	191.4	4,475
Netherlands	40,434	664.5	16,433
Austria	39,647	331.1	8,352
Sweden	37,526	345.8	9,214
United Kingdom	36,571	2,241.5	61,291
Germany	35,552	2,921.3	82,170
France	34,262	2,125.8	62,046
Spain	30,757	1,430.2	46,501
Italy	30,705	1,838.2	59,865
Greece	30,661	344.7	11,242
Slovenia	28,894	58.8	2,034
Czech Republic	25,755	268.6	10,428
Slovakia	22,242	120.2	5,405
HUNGARY	**19,830**	**199.0**	**10,034**
Lithuania	18,855	63.3	3,357
Poland	17,560	669.2	38,110
Croatia	16,474	73.0	4,433
Russian Federation	16,161	2,292.8	141,875
Turkey	13,447	1,005.4	74,766
Romania	12,698	273.0	21,498
Bulgaria	12,372	94.3	7,621
Serbia	10,911	80.2	7,354
Ukraine	7,634	353.0	46,237
Bosnia & Herzegovina	7,618	29.3	3,843

Source: http://imf.org, www.prb.org

Fig. 4

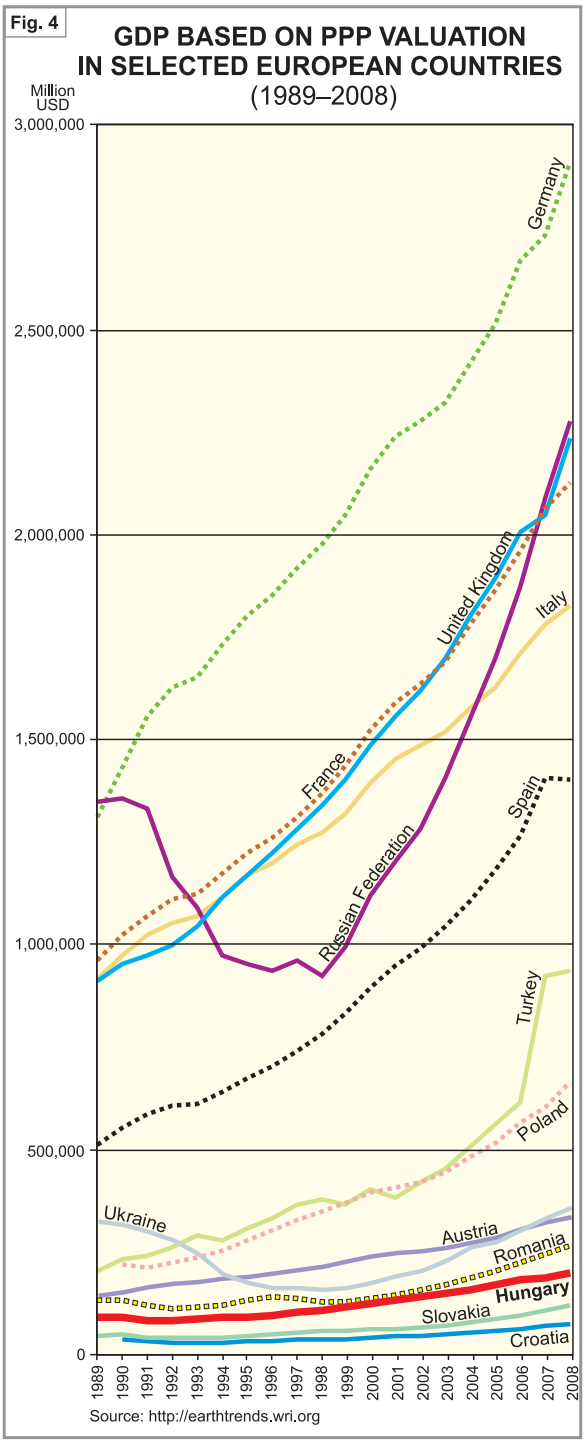
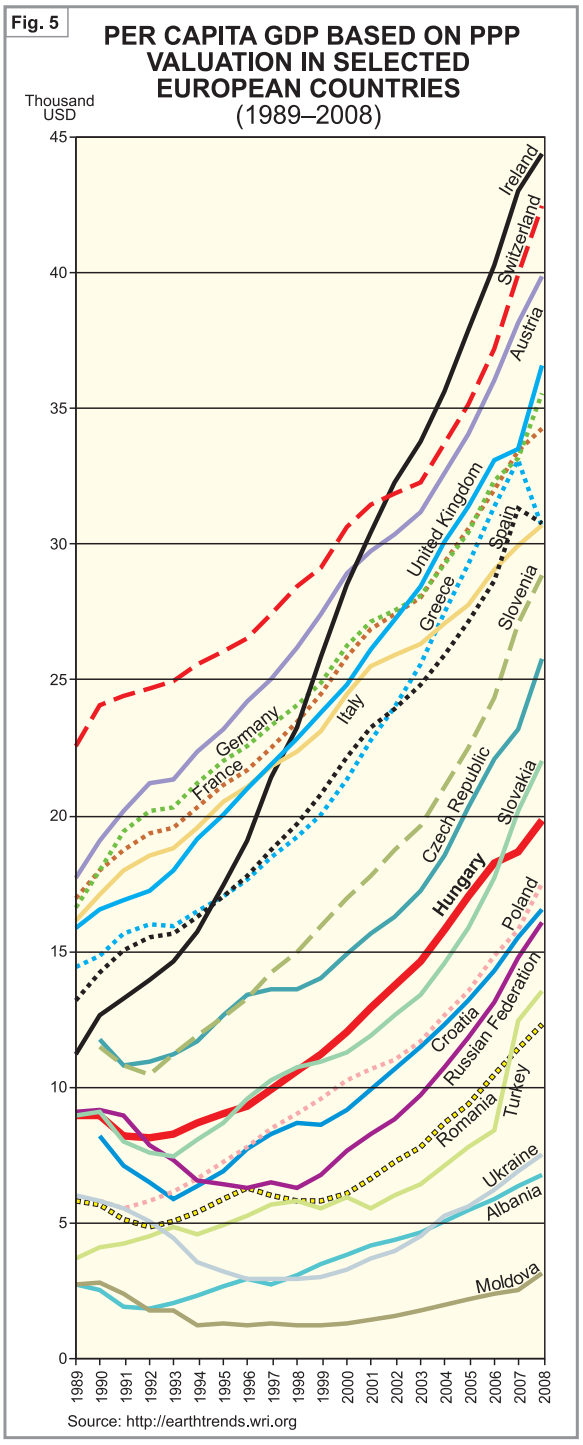


Fig. 5



by 10–15% in the Visegrad countries (including Hungary) by 1991–1992; by 20–30% in South-East Europe by 1992–1993, and by 30–40% in the Baltic states by 1993–1994. GDP had also sunk by approximately 30% in the Russian Federation by 1997–1998, and by 51% in Ukraine by 1995–1998 *(Figure 4)*. GDP figures last seen in 1989 only returned to Poland after 5 years, and the recovery took 7 years in Hungary and Slovakia, 11 years in Croatia, 12 years in Bulgaria and Romania, 13 years in Latvia and Lithuania and 14 years in Russia. In the meantime, the developed western nations had increased their GDP by 80–110% between 1989 and 2008; Ireland (a nation of 4.5 million inhabitants) was akin to an economic miracle achieving GDP growth of 381% over the period mentioned. The richest countries in Europe (defined by having GDP per capita of 30,000 USD or more, based on PPP valuations) were and are to be found in the western part of

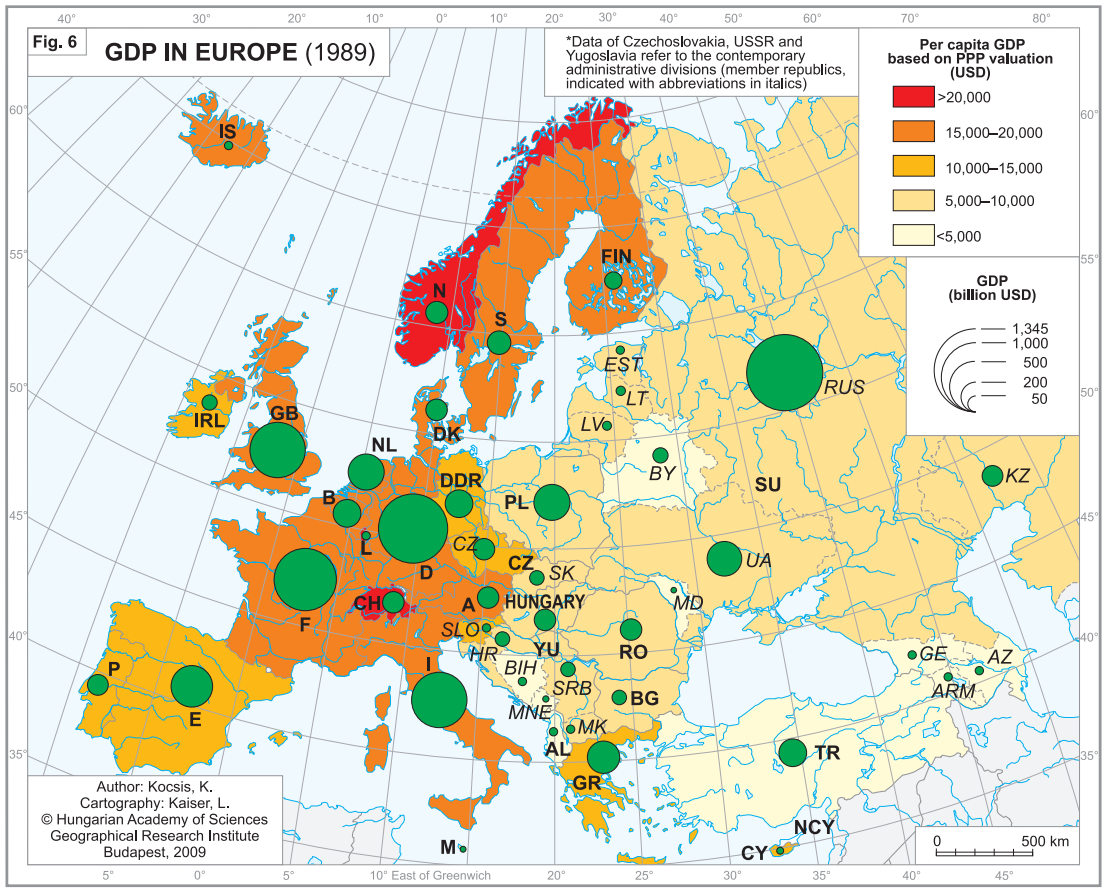


Fig. 6
GDP IN EUROPE (1989)
*Data of Czechoslovakia, USSR and Yugoslavia refer to the contemporary administrative divisions (member republics, indicated with abbreviations in italics)
Per capita GDP based on PPP valuation (USD)
>20,000
15,000–20,000
10,000–15,000
5,000–10,000
<5,000
GDP (billion USD)
1,345
1,000
500
200
50
IS
N
S
FIN
EST
LT
LV
RUS
IRL
GB
DK
NL
BY
SU
KZ
B
DDR
PL
L
CZ
UA
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Cartography: Kaiser, L.
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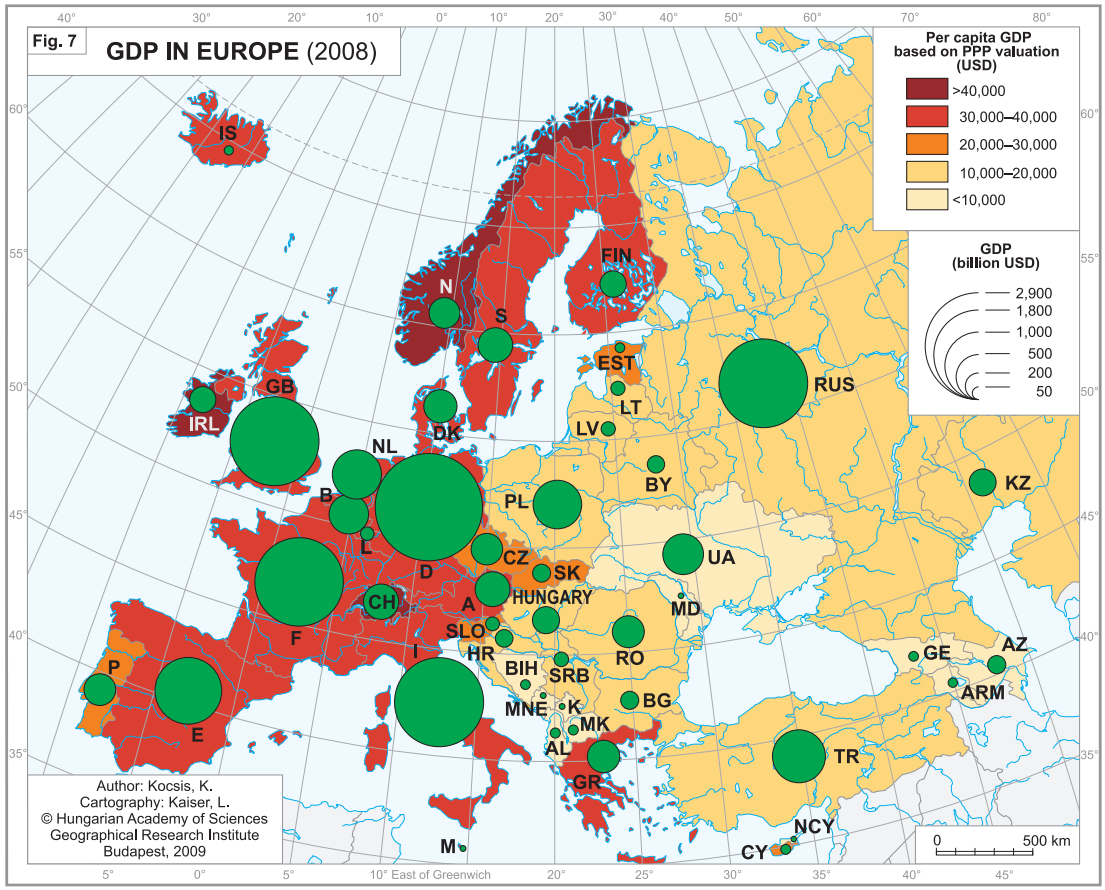
Fig. 7
GDP IN EUROPE (2008)
Per capita GDP based on PPP valuation (USD)
>40,000
30,000–40,000
20,000–30,000
10,000–20,000
<10,000
GDP (billion USD)
2,900
1,800
1,000
500
200
50
IS
N
S
FIN
EST
LT
LV
RUS
GB
IRL
DK
NL
BY
KZ
B
PL
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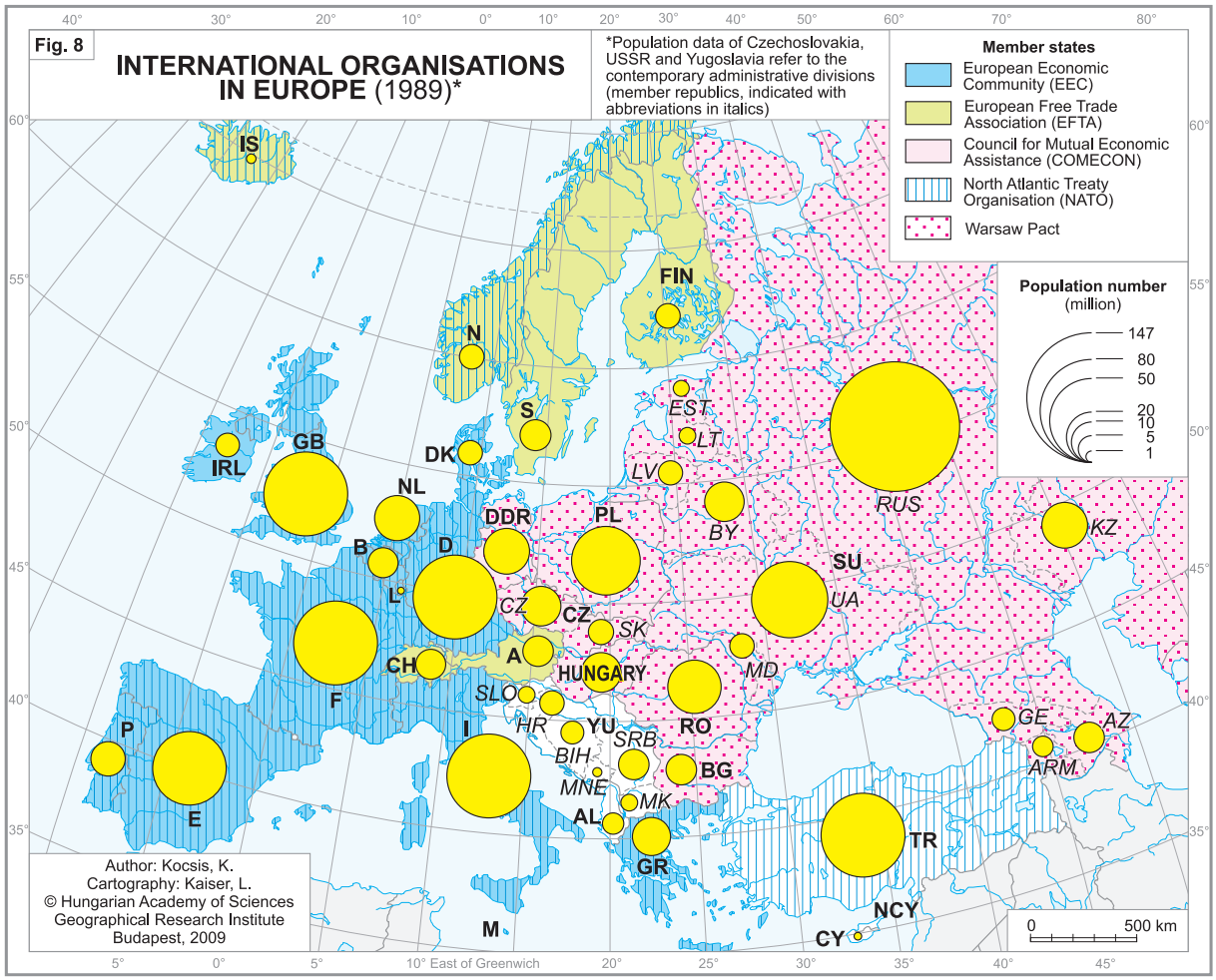
Central Europe and in North and North-West Europe (*figures 5* through *7, Table 3*). Regional inequalities between the post-Communist countries during the last two decades have barely decreased. In this respect Hungary's position has not changed: per capita Hungarian GDP (based on PPP valuations) is only behind the respective data for Slovenia, the Czech Republic and Slovakia among the former socialist countries (similar to 1989).

International Relations

Following World War II, due to its geographical location and the Yalta Agreement (1944), Hungary became part of the USSR's sphere of influence (i.e. the Eastern Bloc). As a new socialist country it took part in the foundation of the economic and military organisations controlled by the Soviet Union (***Comecon 1949***, ***Warsaw Pact 1955***, *Figure 8*) and joined the ***United Nations*** (14 December ***1955***). During four decades of socialism, located on the 'wrong' side of the 'East–West dichotomy', Hungary was presented with little opportunity to integrate into the western European ebb and flow, but it became a member of the most important international economic and financial organisations relatively early (***GATT 1973, IMF 1982***), despite criticism from other Eastern Bloc countries. By the late 1980s Hungary had established diplomatic relations with 130 states of the 159 UN members and operated 63 embassies and 10 general consulates in-line with the economic and political interests of the contemporary regime.



Hungary set an example of regime change to other Eastern Bloc states being the first country to begin dismantling the 'iron curtain' in 1989 and to sign the EC Association Treaty. The collapse of Comecon, the Warsaw Pact and the Soviet Union in 1991 terminated the country's dependence on Moscow. A newly independent state, the Republic of Hungary declared its main foreign policy goals to be: 1. Euro-Atlantic integration; 2. The maintenance of good relations with neighbouring countries; and 3. The provision of support for ethnic Hungarians living abroad in the frame of the new nation policy. Signing ***basic treaties*** with Slovenia in 1992, Ukraine in 1993, Croatia and Slovakia in 1995, and with Romania in 1996, Hungary has firmed its relations with its neighbour countries. In ***1996*** (together with Poland and South Korea) Hungary became a member of the ***OECD*** (Organisation for Economic Cooperation and Development), an international organisation of 30 countries predominantly comprised of high-income economies. Hungary joined ***NATO*** in ***1999*** (together with the Czech Republic and Poland), and ***European Union*** accession followed on 1 May ***2004*** *(Figure 9).*

The primary influence over the country's developmental framework and foreign policy is the EU. Hungary was the first to ratify the Treaty of Lisbon (13 December 2007), which has been conceived to raise EU integration to a higher level. The next important step towards a more active EU presence was accession to the EU's internal borderless territory in the frame of the ***Schengen Treaty*** (21 December ***2007***).

Besides maintaining balanced political and economic relations with neighbouring states, in the frame of its new nation policy Hungary also strives to win room for the acceptance of ethnic community rights and for bringing ethnic Hungarians together within the European community. In the furtherance of this aim in ***2001*** the Hungarian government passed Law LXII (known as the ***Hungarian Status Law***) to formalise ties with ethnic Hungarians in neighbouring states, granting them rights in Hungary and direct benefits from the Hungarian government.

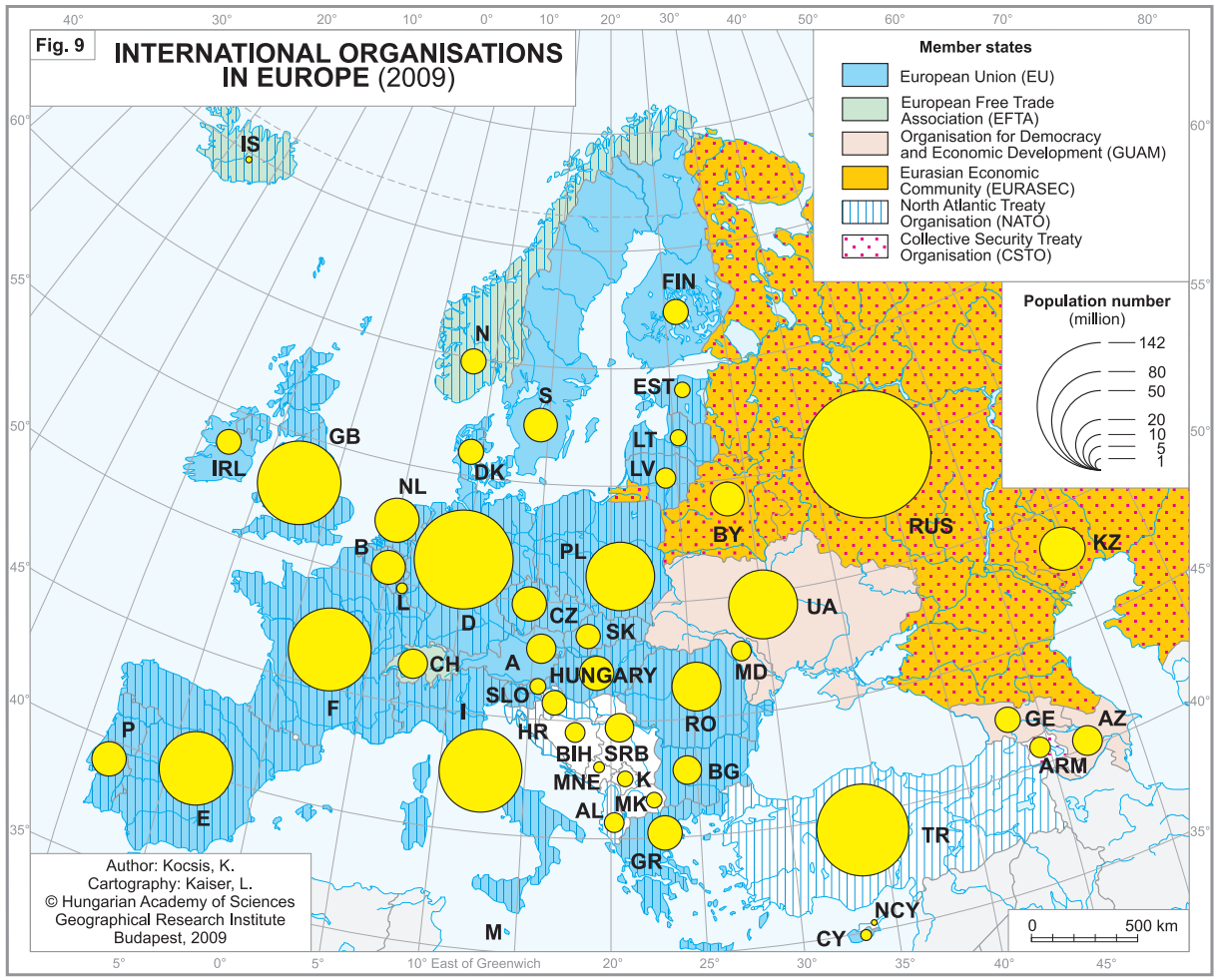
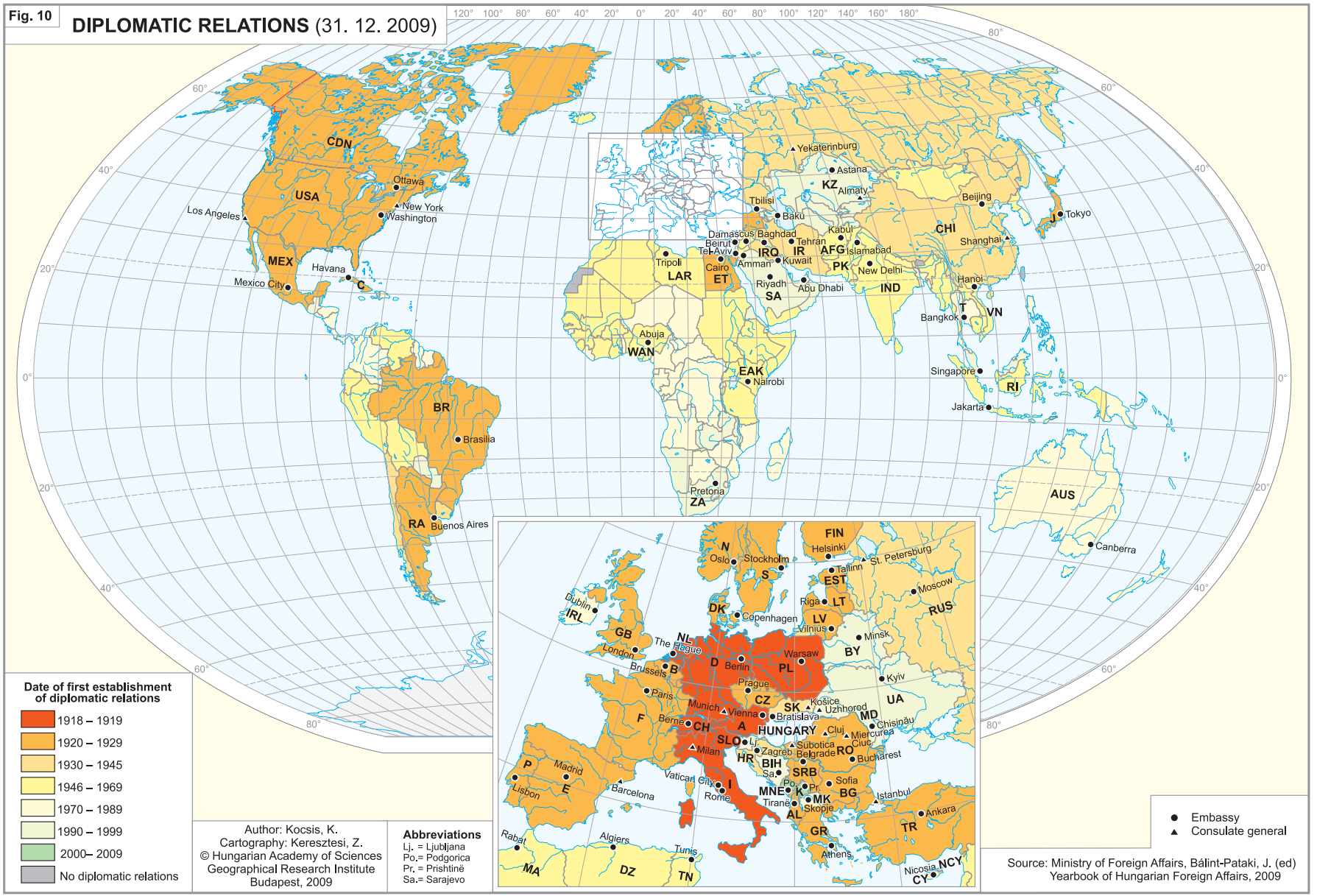


Fig. 10

DIPLOMATIC RELATIONS (31. 12. 2009)



In the ***East Central European*** sphere Hungary participates in numerous ***regional co-operation forums***, such as in the Visegrad Group (with Poland, Czech Republic and Slovakia), in the Quadrilaterale (with Croatia, Italy and Slovenia) and in the Regional Partnership (with Austria, the Czech Republic, Poland, Slovakia and Slovenia). As a supporter of the Euro-Atlantic integration of the west ***Balkan*** countries, Hungary is participating in EU's Security and Defence policy missions (EUFOR in Bosnia and Herzegovina and EULEX in Kosovo). The Hungarian contribution is important not only in terms of military assistance, but also in the economic reconstruction of South-East Europe; the region where over half of outward Hungarian FDI (Foreign Direct Investment) is directed to. In the framework of the EU's Neighbourhood Policy, Hungary also strives to promote ***Ukraine***'s aspirations of accession to the EU and NATO. Maintaining balanced relations with ***Russia*** based on mutual interests is of key importance from the point of view of securing Hungary's energy supply. Besides the ***USA*** – which possesses a privileged position in Hungary's network of foreign economic and diplomatic relations – the following macroregions are of primary importance for Hungary with a view to improving competitiveness, providing new markets for Hungarian companies, securing capital investments and for diversifying the energy supply: Asia (e.g. China, South Korea and India), Middle East-Gulf states and North Africa.

The new priorities of Hungarian foreign policy are reflected in the statistics and geographical location of diplomatic missions *(Figure 10)*. Following 1989 Hungary closed 17 (mostly African and Asian) embassies in countries which have lost their political importance for Hungary (e.g. Angola, Cambodia, Laos, North Korea and Zimbabwe). Parallel to this, 35 new embassies were established, mainly in the successor countries to the disintegrated federal states (e.g. the USSR, Yugoslavia and Czechoslovakia) and in the Asian and African regions of primary economic importance mentioned above. The new general consulates over the last two decades have predominantly been established in select metropolises of the country's most important partners, e.g. in the EU (Munich, Milan, Barcelona); in the Americas (Chicago, Los Angeles, Toronto, São Paulo); in China (Shanghai, Hong Kong); and in Russia (Yekaterinburg). To strengthen its ties with the Hungarian minorities living in the Carpathian Basin, Hungary's new general consulates have also been established in towns that are of significance for ethnic Hungarians of the neighbouring countries (e.g. Miercurea Ciuc/Csíkszereda RO; Subotica/Szabadka SRB; Uzhhorod/Ungvár UA; and Košice/Kassa SK).

Particular mention should be accorded to the fact that recently several international organisations have moved their regional or managerial offices to Budapest: the UN's FAO (Food and Agriculture Organisation) Regional Office for Europe and Central Asia, the FAO's Joint Service Centre, the European Centre of the International Federation of Red Cross and Red Crescent Societies, the administrative and service centre of the Office of the UN High Commissioner for Refugees, and the Institute for Innovation and Technology of the European Union.

CHARACTERISTICS OF HISTORICAL EVOLUTION

Human settlement and the emergence of nation states in the Carpathian (Pannonian, Central Danubian) Basin have shown exceeding intricacy over time: peoples, states and empires have both emerged and vanished. The Conquest starting in 895, rendered Hungarians the foremost political influence in the Carpathian Basin. There were frequent and considerable changes in the territory of the Hungarian state and also of that under Hungarian sovereignty. The decisive events were in part triggered by internal affairs, but in most cases they were provoked by power struggles in both Hungary's immediate vicinity and the European space in general, and sometimes enforced upon the nation by greater powers. Continuity and change are manifest in a special way during the 1100 years of eventful history and a changing territorial configuration of the Hungarian state.

Major Periods in the Development of the Hungarian State

The region that is home to Hungary has historically been in a continuous state of change, following the macroregion's general trends in its development (*figures 11 and 12*). An essential thread that runs through all events is that Hungary has always been located in the vicinity of significant, or even world powers, giving rise to circumstances that have caused frequent changes in the location of its national borders.

Changes in Territory from 895 to the Fall of the Independent Hungarian State (1526)

Following the Conquest starting in 895, Hungarian tribes, which had migrated from the eastern European steppes, found themselves in a new geographical locale and settlement environment with a differing ethnic make-up and subject to new political influences. The Hungarians gradually took possession of the basin, and exerted their control over most of its peripheries too. A system of tribal alliances ensured the unity of their territory vis-a-vis outsiders, yet allowed room for tribal individuality to flourish within their territory. The core area of the tribal alliance emerged in the Danube Bend region, which is located almost in the centre of the Carpathian Basin. The adoption of Christianity and the creation of a Christian kingdom at the turn of the millennium involved a conscious effort to integrate into the European and neighbouring environment.

Hungarian history academia traditionally divides the era up to 1526 into two phases: the period of the Árpád dynasty and the age of the elected kings.

During the rule of the Árpáds, the relative influence of the Hungarians changed repeatedly, for example achieving great power under Béla III in the late 12th century, followed by a crushing defeat during the Mongol invasion of 1241–1242. In the last year of the national monarchy (1301), the feudal title of the Hungarian ruler (King of Hungary, Dalmatia, Croatia, Rama, Serbia, Galych, Volhynia, Cumania and Bulgaria) referred to previous conquests, but the title and the territory controlled had become disconnect-

Fig. 11

STATES IN THE AREA OF THE CARPATHIAN BASIN (1000–1600)

Author: Bereznay, A., Kocsis, K. Cartography: Kaiser, L.

Fig. 12

STATES IN THE AREA OF THE CARPATHIAN BASIN (1648–2009)

Author: Bereznay A., Kocsis, K. Cartography: Kaiser, L.

ed. The contemporary attitude to power treated the mother country and the empire separately.

The age of the elected kings from various dynasties (1301–1526) is important due to the common possessing of (e.g. Hungarian, Polish, Czech) crowns that had already borne dynastic and modern empire-building aspirations. The rule of the Angevins (1301–1395, e.g. Charles I; Louis I the Great) had turned Hungary into one of the decisive powers in Central Europe with respect to its economic, political and military power. The Hungarian-Polish personal union (1370–1382) did not lead to the unification of the two nations' resources, rather it served merely as a union tailored to suit the life events of Louis the Great.

The hallmark of the entire 15th century was the struggle of the Hungarian state against the Ottomans (Turks), with varying degrees of success, resulting in neither a strategic victory, nor a defeat. Sigismund of Luxembourg's impressive international prominence and achievements (not least as Emperor of the Holy Roman Empire) did not yield immediate results in the conflict.

The reign of Matthias Corvinus (1458–1490) bought notable conquests in the west, but his activities were not as enthusiastic or effective in the south (against the Ottomans). Matthias's Hungarian Empire was short-lived, and did not become an organic political-sovereign space.

The problems of Divided Territory (1526–1686)

With the advance of the Ottomans in the Balkans, Hungary gradually lost its sphere of influence in the north of the peninsula. By taking Belgrade and its environs (1521), the Turks entered the Carpathian Basin. The chain of events that began after the 1526 Mohács defeat (the emergence of a bipartite and later tripartite country) resulted in internal divisions and external (Ottoman and Habsburg) aspirations. The Habsburg Kingdom of Hungary, the Ottoman vassal East Hungarian state (since 1570 known as the Principality of Transylvania) and the areas under direct Ottoman rule showed striking differences in many aspects of their development.

In the wars between Christendom and Islam, the Habsburgs and the Ottomans, the central and southern areas of the Carpathian Basin, it was the core area of Hungarian ethnic territory that suffered the heaviest human and material losses. For the period of the struggle that continued for approximately 150 years, political, economic, social and religious structures were put under stress.

The Integrated Hungarian State During the Habsburg Period (1686–1918)

The liberation of the country began after the unsuccessful Ottoman attack on Vienna (1683). Habsburg forces retook Buda in 1686 and the rest of the country's territory gradually succumbed thereafter. Following the liberation war, the Habsburgs did not however reinstate Hungary's historical pre-Ottoman structure; the Viennese Court exercised its will over the country in economic, population-related, ethnic-religious and spatial matters, pursuant to its own interests, and treated the liberated Hungarian territories as new acquisitions.

The real question was whether it would be possible to integrate Hungary into the united Habsburg Empire, or a semi-independent structure was to be established. The Hungarian nobility was adamant about the country's constitutional and territorial unity, but it could only achieve these ends in part.

Integration had led to conflicts, culminating in the war of freedom led by Prince Ferenc

Rákóczi II (1703–1711). This attempt to create an independent Hungarian statehood (through the dethronement of the Habsburg dynasty, 1707) did not find favour with the balance of power in contemporary Europe, thus it had turned out to be unsuccessful.

The Pragmatica Sanctio, i.e. the matrilineal succession of rulers in the Habsburg Empire, was adopted in Hungary and Transylvania (1722–1723) and allowed for the preservation of the empire's unity by public law, and also paved the way for semi-autonomous internal governance in Hungary.

The emergence of the enlightenment, and movements that fostered a national awakening, promoting the idea of a republic, resulted in substantial shifts in Hungary. Enlightened absolutism – especially under Joseph II – initiated significant reforms towards rationalising the empire and preserving its unity, but in many ways it turned against the mainstream.

From 1825 onwards, an age of reform posed simultaneous questions as regards the economy, society, politics, nationality, use of language, transport, and even river regulation. Parliament attempted to foster progress from the top down.

In line with similar European events, the March 1848 revolution raised the question of national independence and also the issue of the ethnic minorities. The medieval Hungarian province, Transylvania declared a reunion with Hungary, while the Ban (Governor) of Croatia took to arms against the 'central Hungarian government', whilst some other minorities (Serbs, Romanians and some Slovaks) held national assemblies and demanded territorial autonomy. In the unfolding struggle for independence (resulting in the dethronement of the Habsburgs and a declaration of independence in 1849), the country was not prepared to respond to the dual challenge without conflict.

After the suppression of the Hungarian War of Independence with the armed assistance of the Russians, Habsburg absolutism disrupted the country's territorial and public administration structure.

The Austro-Hungarian Compromise of 1867 turned the Habsburg Empire into the Austro-Hungarian Monarchy, the bi-product of which was a constitutionally and politically complicated structure. The Monarchy became involved in European politics as a legitimate, major power, internally operating as a macroregional framework for modernisation.

The Hungaro-Croatian Compromise of 1868 settled the constitutional and public administration questions posed between Hungary and Croatia-Slavonia-Dalmatia. Hungarian territory was reunited with Transylvania, whilst its relationship with the associate country (Croatia-Slavonia, with its developed territorial autonomy) acquired an administrative character.

In spite of aspirations of territorial autonomy borne by minorities living within the country's territory (predominantly Serbs, Romanians and Slovaks) they were unable to achieve this. The concept of the political nation (per the French model) became dominant in Hungary, which incorporated ethnic minorities in its vision, but the majority of them rejected this as unsatisfactory.

Following the 1878 Berlin Congress, the Monarchy invaded and pacified Bosnia and Herzegovina. In 1908, the two provinces were annexed and in 1910 became an Austro-Hungarian common, autonomous province (condominium).

The period of Dualism is particularly notable from the viewpoint of the history of statehood in the Carpathian Basin, in the sense that economic and infrastructural development (and modernisation in general) was being undertaken in a region not just limited to the basin itself, rather on the whole territory of the Austro-Hungarian Monarchy, and historical Hungary was a scene of a semi-integration during the period of modernisation.

World War I (1914–1918) started following the Monarchy declaring war on Serbia, and warfare brought to light the Monarchy's structural weaknesses.

After the 1916 military victory over Roma-nia, there was an important 'correction' to the Carpathian border, during which 3,772 km^2 of territory (encompassing 42 villages with 22,915 inhabitants) was incorporated into Hungary.

The Partitioned Historic State and its Changing Environs

The Uncertainty of Disintegration (1918–1920)

By autumn 1918, it had become clear to all actors that the Central Powers had lost the war. The Monarchy was unable to break-away from Germany, and the military defeat led to the disintegration of the former. The peoples under the Monarchy proclaimed their sovereignty one after the other; and in October 1918 Hungary also emerged as a sovereign state. On 16 November 1918, an 'independent and autonomous people's republic' was proclaimed.

Neither the civil democratic revolution nor the proletarian dictatorship that was briefly in power from March–July 1919 (Hungarian Soviet Republic) was able to defend the nation's territorial integrity. Whilst the Hungarian Soviet Republic was able to achieve military and political success in the historical territories of Upper Hungary (today mostly Slovakia), the superior might of the Allied powers and their politics ultimately prevailed after this briefly uncertain period.

Internationally Approved Territory and Territorial Revisionist Politics (1920–1938)

The Treaty of Trianon (4 June 1920) codified and legally guaranteed the new borders of the partitioned Hungary. The territory of much of the former Kingdom of Hungary, including areas inhabited predominantly by ethnic Hungarians, were divided up among neighbouring states *(tables 4 and 5)*.

These neighbouring countries having extended into part of the Carpathian Basin, their primary aim was to legitimise these newly acquired territories through international organisations (such as the League of Nations) and multilateral agreements (Little Entente).

The defining goal of Hungarian internal and foreign policy was to achieve territorial revision, which enjoyed almost complete support from the population within the country, as well as that of Hungarians living abroad (who comprised one third of all ethnic Hungarians).

The goal of territorial revision had set Hungarian foreign policy on a forced trajectory, since it could only rely on the assistance of, and cooperation with countries that questioned the Paris treaties. Hungary was therefore becoming gradually but increasingly integrated into the alliance system of the Axis powers.

Table 4. ***Territorial and administrative changes of the Hungarian state (1900–1947)***

Area	Year	Area (km^2)	Population number	Number of counties	Number of districts
Hungarian Empire *(Hungary and Croatia-Slavonia)*	1900	325,411	19,254,559	71	484
	1910	325,411	20,886,487	71	513
"Trianon Hungary"	1920	92,952	7,990,202	34	163
	1930	93,073	8,688,319	25	154
"Enlarged Hungary"	1938	105,000	10,382,014	31	172
	1939	117,061	11,076,036	34	184
	1940	160,165	13,653,296	44	246
	1941	171,640	14,683,323	44	264
Republic of Hungary	1947	93,011	9,316,613	25	150

Source: Hajdú, Z. 2005.

Table 5. ***Partition of the Hungarian state among the neighbour states according to the Treaty of Trianon (1920)***

Country	Area		Population	
	km²	%	number	%
	By 1910 census			
Romania	102,813	31.6	5,237,911	25.1
Kingdom of Serbs, Croats and Slovenes	63,370	19.5	4,149,840	19.9
Czechoslovakia	61,646	18.9	3,516,815	16.8
Austria	4,020	1.2	292,631	1.4
Poland	589	0.2	24,880	0.1
Fiume (since 1924 Italy)	21	0.0	49,806	0.2
All disannexed	*232,459*	*71.4*	*13,271,353*	*63.5*
Left to Hungary	*92,952*	*28.6*	*7,615,134*	*36.5*
Hungarian Empire	**325,411**	**100.0**	**20,886,487**	**100.0**

Source: 1920 census, Part VI. Summary of outcomes, Hungarian Royal Central Statistical Office, Budapest, 1929.

Partial Territorial Revisions (1938–1944)

In March 1938, Germany annexed Austria (known as the Anschluss), immediately becoming, (particularly through its possession of Burgenland, formerly western Hungary), a great power in the Carpathian Basin. From this moment on, it essentially controlled regional economic, political and military decision making within the region.

Between 1938 and 1941, each and every year brought territorial gains for Hungary. In 1938, the First Vienna Award returned the southern parts of Czechoslovakia, predominantly inhabited by ethnic Hungarians (essentially the majority of the northern Hungarian ethnic territory that was originally occupied by Czech troops in 1919). In 1939, following the dissolution of Czechoslovakia, Subcarpathia, mainly inhabited by Ruthenians (Rusyns) (today Transcarpathia in Ukraine) was occupied and annexed by Hungary, turning it once more into a multi-ethnic state. In 1940, the Second Vienna Award reapportioned North Transylvania, thus reintroducing another significant national minority (Romanians) within the new national territory. In 1941, after the German invasion and formal disintegration of Yugoslavia, some of the formerly southern Hungarian territories were returned to the country, involving another large influx of minorities (e.g. Serbs, Germans, Croats and Slovenes).

The territory, population and administrative structure of the Hungarian state changed year by year; borders within the Carpathian Basin had become almost 'fluctuant', moving mostly by German intervention. The territorial changes only benefited from partial Axis power guarantees; the respective affected states (e.g. Slovakia, Romania and Serbia) had only accepted them grudgingly. It was clear to everyone that the outcome of the war would settle the fate of the borders.

The Uncertainties of 'Floating' (1944–1947)

In October 1944, Hungary had attempted to exit from its world war alliance, proclaiming a preliminary peace with the Allied Powers, but the attempt had been unsuccessful. World War II ended with the country on the losing side. In fact, Hungary was not alone as among its neighbours, Romania and independent Slovakia and Croatia were also on the side of the defeated (the latter two were again incorporated into victorious nations, the resurrected Czechoslovakia and Yugoslavia). During the final year of the war Hungary was occupied by the Red Army of the USSR.

Following the 1945 democratic elections, a coalition government was formed, which made

considerable efforts aimed at the reconstruction of the devastated country. On 1 February 1946, the Republic of Hungary was declared. In the end, the Paris Peace Treaty (signed 10 February 1947), reinforced the Trianon borders and ceded an additional three Hungarian villages near Bratislava (Pozsony) to Czechoslovakia to 'defend' the Slovak capital.

Hungary in a Divided Europe

Between 1947 and 1991, national borders within the Carpathian Basin were frozen, but events within the Soviet occupation zone had taken place somewhat differently after 1947. The region had the 'ordinary socialist states' (the Soviet Union, Czechoslovakia, Hungary, Romania, etc.), but Yugoslavia exercised independent politics and become non-aligned, whereas Austria, initially occupied by Allied forces subsequently regained independence and became neutral after 1955.

During the initial phases of the Cold War, divisions had almost resulted in hermetic isolation. In reality, two 'iron curtains' had descended on the Hungarian borders; one towards the west, and one towards the Soviet Union and other 'fraternal socialist states'. The latter was only an iron curtain regarding the movement of people, yet remained an 'open border' for the movement of ideological intellectual capital, raw materials and military forces.

Hungary was forced to integrate into the framework of the CMEA (or Comecon, 1949) and the Warsaw Pact (1955). During the Hungarian revolution of 1956, the interim government withdrew from the Warsaw Pact and announced the country's neutrality, initiating new internal political events.

From the beginning of the 1960s, the tensions gradually dissolved, but the normalisation of relations with the west were proceeding slowly. In its opening-up toward the west, Hungary's relatively balanced foreign policy played a significant role.

From the beginning of the 1980s, Hungary had become increasingly indebted financially, which, in a peculiar way, had forced it to join international financial organisations, while internal political consolidation was gradually ceasing after 1985.

Hungary and the Reorganisation of its Environs after Political Transformation

The collapse of Eastern Bloc socialist regimes (which in Hungary was termed 'regime change', and carried out between 1988–1990) led to fundamental social, economic and political structural changes. The disintegration of Yugoslavia accelerated from summer 1991; Croatia and Slovenia became independent, gradually gaining recognition by the international community. In place of the formerly united Yugoslavia, new neighbouring states were formed. During Christmas 1991, the Soviet Union itself formally broke-up; with unchanged borders, Ukraine had become Hungary's north-eastern neighbour. On 1 January 1993, Czechoslovakia peacefully split into the Czech Republic and Slovakia, and the latter became Hungary's new northern neighbour. In 1995, Austria became a full member of the European Union. With this step a new, great sphere of integration had appeared in the Carpathian Basin. The Euro-Atlantic integration of this macroregion started with the NATO membership of Hungary (1999); and Slovakia, Slovenia and Romania (2004). This was followed by the EU-accession of Hungary, Slovakia and Slovenia (2004), and later Romania (2007).

For the entire community of ethnic Hungarians, EU and NATO membership of Hungary and the neighbouring states with the largest Hungarian minorities is of historical significance, as it has finally brought the majority of Hungarians into the European community, allowing them to cherish the same economic, social and political ideas and values.

NATURAL ENVIRONMENT

Geophysics

Geodynamics

Alpine, Carpathian and Dinaric mountain belts surround the Pannonian (Carpathian) Basin, of Neogene through Quaternary in age. The Cenozoic evolution of the Alpine-Pannonian region is primarily controlled by the northward drift and collision of the Adriatic promontory with Europe, producing a net convergence of at least 500 km in the Alps. Adria has been pushed towards the north by the African plate even if it was not always tightly attached to Africa.

A most pronounced expression of this collision has been the Late Oligocene to Early Miocene eastward extrusion of an Alpine orogenic wedge, called the ALCAPA (Alps-Carpathians-Pannonian) terrane. There is a second unit in the substrata of the Pannonian Basin called the Tisza-Dacia terrane. It is generally accepted that the Tisza-Dacia terrane rifted apart from the European margin of the Mesozoic Tethys during the Late Jurassic, and this rifting led to the formation of a marine basin, where the Alpine-Carpathian flysch complexes were deposited. The two terranes became juxtaposed during the Late Oligocene and formed the substrata of the later Pannonian Basin.

The Pannonian Basin and its surroundings are characterised by a polyphase deformation history with a sequence of distinct structural episodes. There is a good knowledge of the principal kinematic features, i.e. the location of major fault zones, the timing and the amount of deformation. A rapid and dramatic change in tectonic style started in the Early Miocene (Eggenburgian through Karpatian) that initiated the formation of the Pannonian Basin. This process culminated in the Middle Miocene (Badenian) and was coeval with a large-scale tectonic transport of the external flysch nappes towards the foreland of the Carpathian arc.

The large-scale lateral extrusion of the ALCAPA and Tisza-Dacia terranes took place from the Early Miocene towards an eastern, unconstrained margin of the Carpathian flysch basin. Lateral extrusion is a crustal-scale process including extensional collapse of the brittle upper crust and ductile flow of the lower crust. Extruding crustal wedges are typically bounded by conjugate sets of strike-slip faults, facilitating an orogen-parallel direction of displacement.

Kinematic data and numerical modelling suggest the predominant role of Carpathian subduction facilitating extrusion and large-scale lithospheric extension in the Pannonian Basin. Continuous roll-back of the subducting plate along the contemporaneous Carpathian arc exerted trench pull forces on the upper plate. The overriding plate in a subduction zone tends to passively follow the retreating hinge of the downgoing lithosphere. This induced tensional stresses and the eastward extension of the ALCAPA and Tisza-Dacia terranes.

Tension in the ALCAPA and Tisza-Dacia terranes caused about 50% to 120% crustal, and mantle lithosphere extension of nearly an order of magnitude higher. Occasionally, extension was concentrated in discrete zones where pull-apart basins developed. Heterogeneous extension is reflected by the variation of pre-Neogene basement depth and crustal thickness. Elevated basement blocks separate deep sub-basins where thickness of the Neogene-Quaternary sedimentary rocks can reach 6 to 7 km. Such irregular basement morphology is mainly the result of strain localisation along pre-existing crustal weakness zones inherited from Late Cretaceous thrust and nappe tectonics.

Thickness of the present crystalline crust varies between 22 and 32 km as a consequence of the extension of the originally overthickened orogenic wedge (*Figure 13*). Estimated thickness of the orogenic crustal wedge was between 40 and 45 km. The remarkable crustal and lithospheric

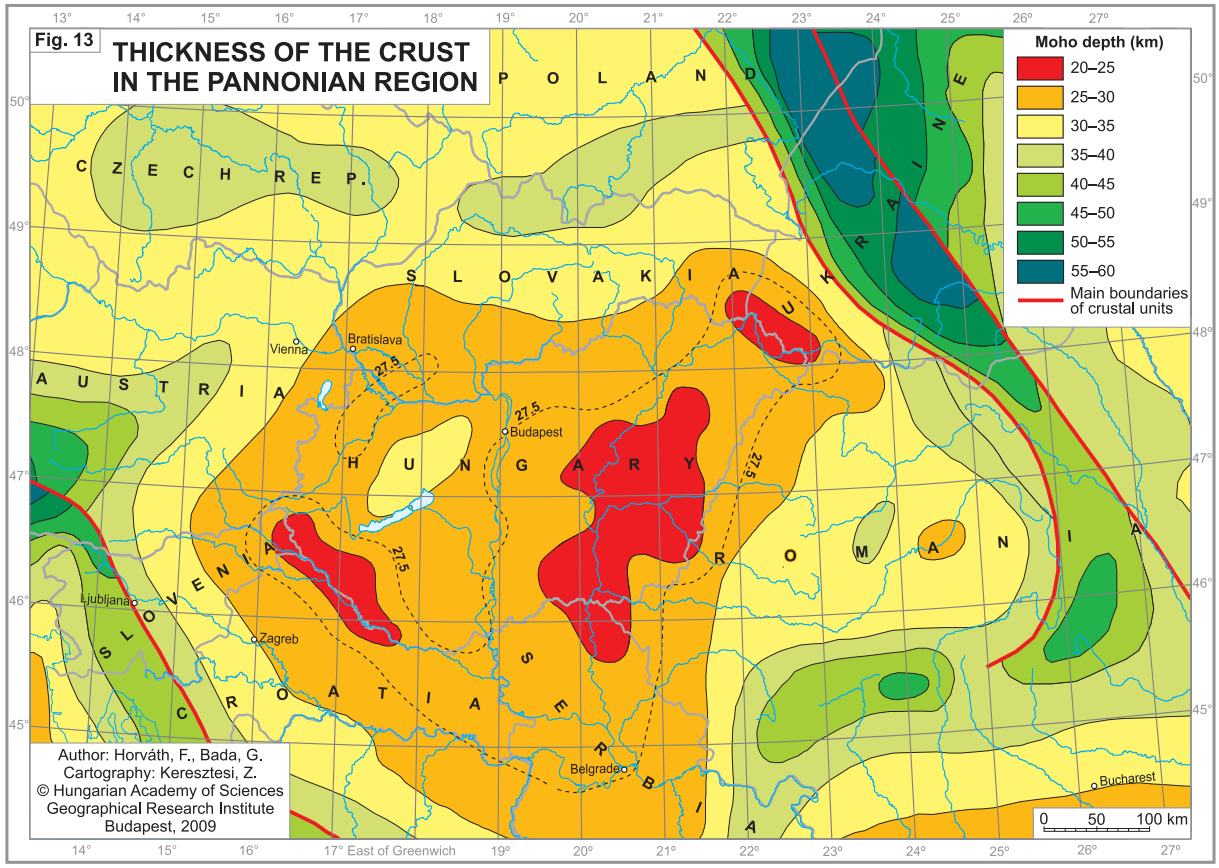


Fig. 13
THICKNESS OF THE CRUST IN THE PANNONIAN REGION
Moho depth (km)
20–25
25–30
30–35
35–40
40–45
45–50
50–55
55–60
Main boundaries of crustal units
POLAND
CZECH REP.
SLOVAKIA
AUSTRIA
HUNGARY
SLOVENIA
CROATIA
SERBIA
ROMANIA
UKRAINE
Vienna
Bratislava
Budapest
Ljubljana
Zagreb
Belgrade
Bucharest
21.5
27.5
Author: Horváth, F., Bada, G.
Cartography: Keresztesi, Z.
© Hungarian Academy of Sciences
Geographical Research Institute
Budapest, 2009
0 50 100 km
17° East of Greenwich

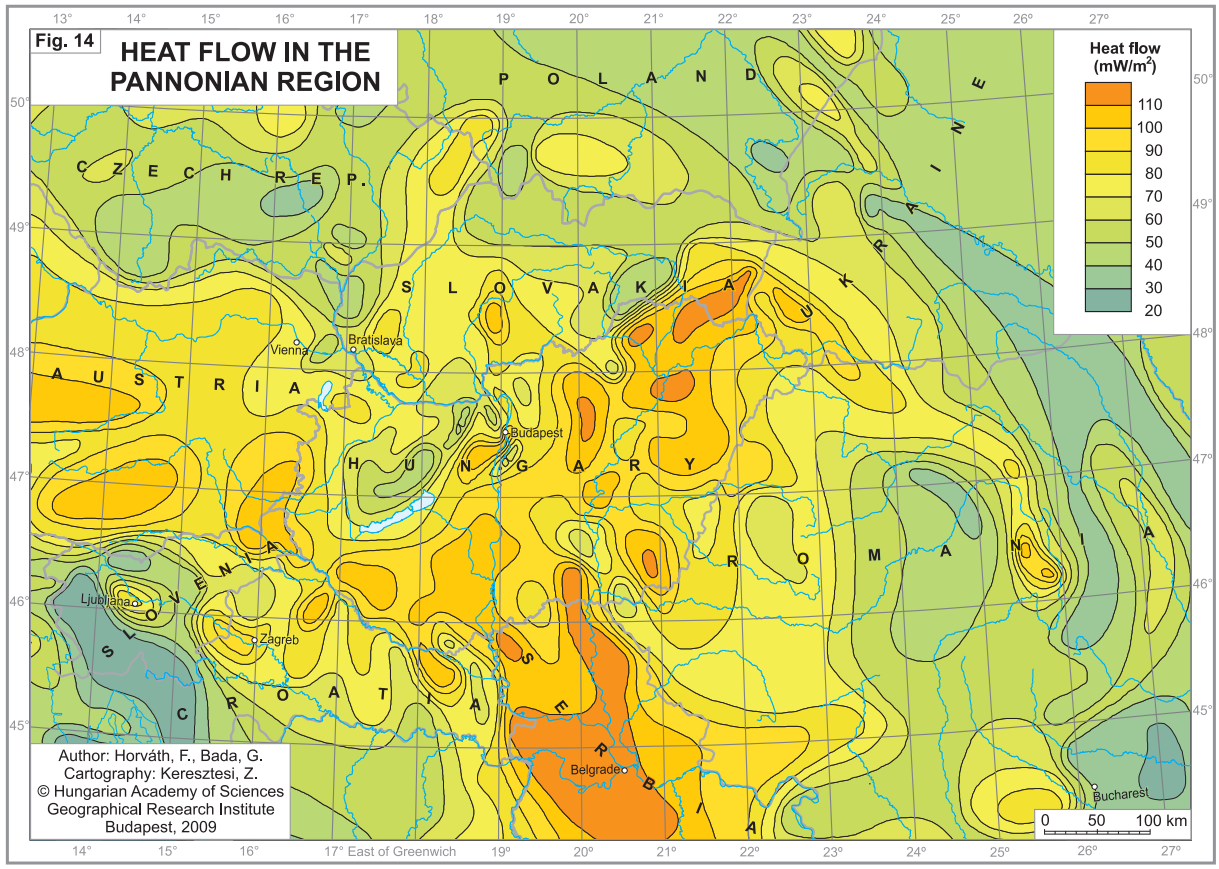


Fig. 14
HEAT FLOW IN THE PANNONIAN REGION
Heat flow (mW/m²)
110
100
90
80
70
60
50
40
30
20
POLAND
CZECH REP.
SLOVAKIA
AUSTRIA
HUNGARY
SLOVENIA
CROATIA
SERBIA
ROMANIA
UKRAINE
Vienna
Bratislava
Budapest
Ljubljana
Zagreb
Belgrade
Bucharest
Author: Horváth, F., Bada, G.
Cartography: Keresztesi, Z.
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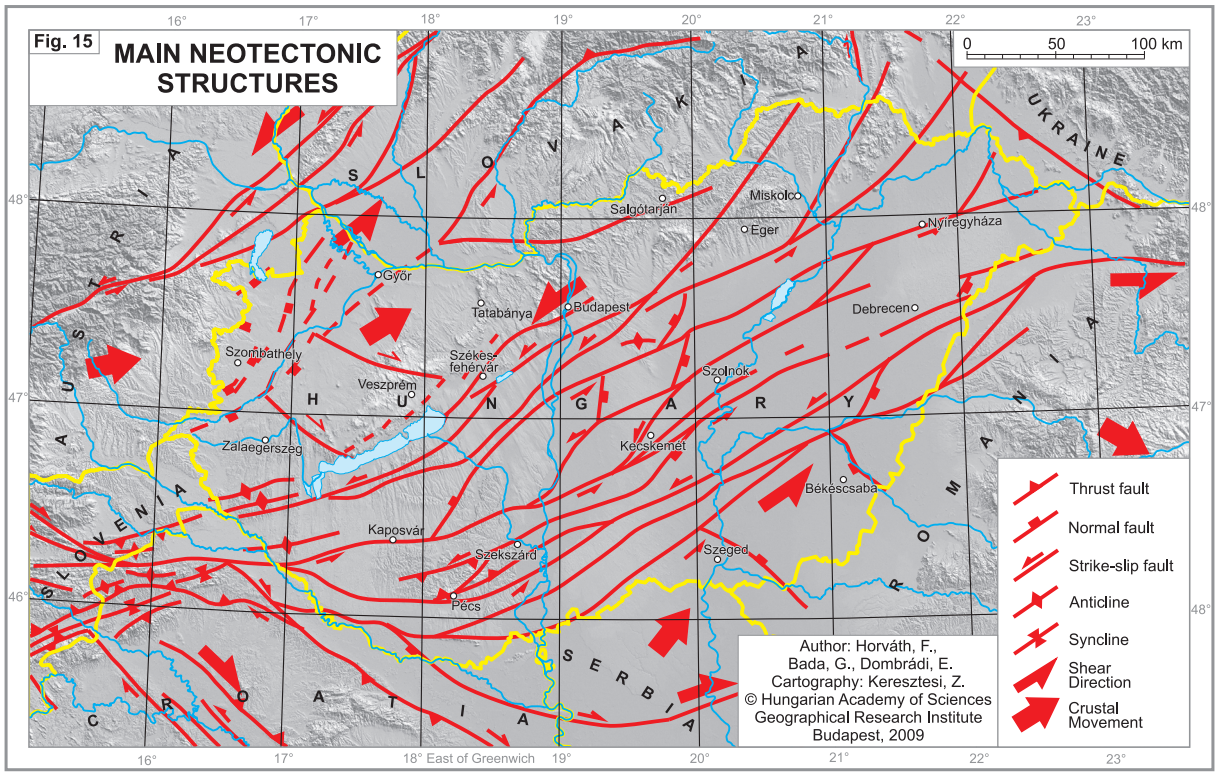
Budapest, 2009
0 50 100 km
17° East of Greenwich

attenuation and asthenospheric updoming during the Middle Miocene resulted in an elevated heat flow of the Pannonian Basin (*Figure 14*). Its present value varies from 80 to 120 mW/m^2, which is about 50 to 100% higher than the continental average.

The recent history of the Pannonian Basin has been characterised by a neotectonic phase. Contemporary stress data, seismicity pattern, Quaternary uplift and subsidence history, surface evolution and young basin-scale deformations indicate that the Pannonian Basin is in the period of structural inversion. Present-day boundary conditions include active collision along the Alps-Dinarides belt (Adria-push), continuing eastward extrusion of ALCAPA, and Tisza-Dacia crustal wedges and their collision with the Eastern Carpathians. The basin system has become completely landlocked and constrained from all directions by a rigid continental frame since the late Pliocene. This has led to a gradual increase in horizontal stress resulting in multi-scale folding and fault reactivation, predominantly in the form of strike-slips and thrusts.

Figure 15 shows the main neotectonic structures of Hungary. It is largely based on a previously published neotectonic map (http://geophysics.elte.hu/atlas/geodin_atlas.htm), compiled in the framework of the geodynamic atlas of the entire Pannonian Basin and its surroundings. The vast geological and geophysical dataset utilised in this project was complemented by newly acquired data as well as available structural and neotectonic information from Hungary and the neighbouring countries. Thus, the updated structural interpretation reflects a synthesis of data from various sources and our present-day knowledge of the neotectonic behaviour of the Hungarian part of the Pannonian Basin.

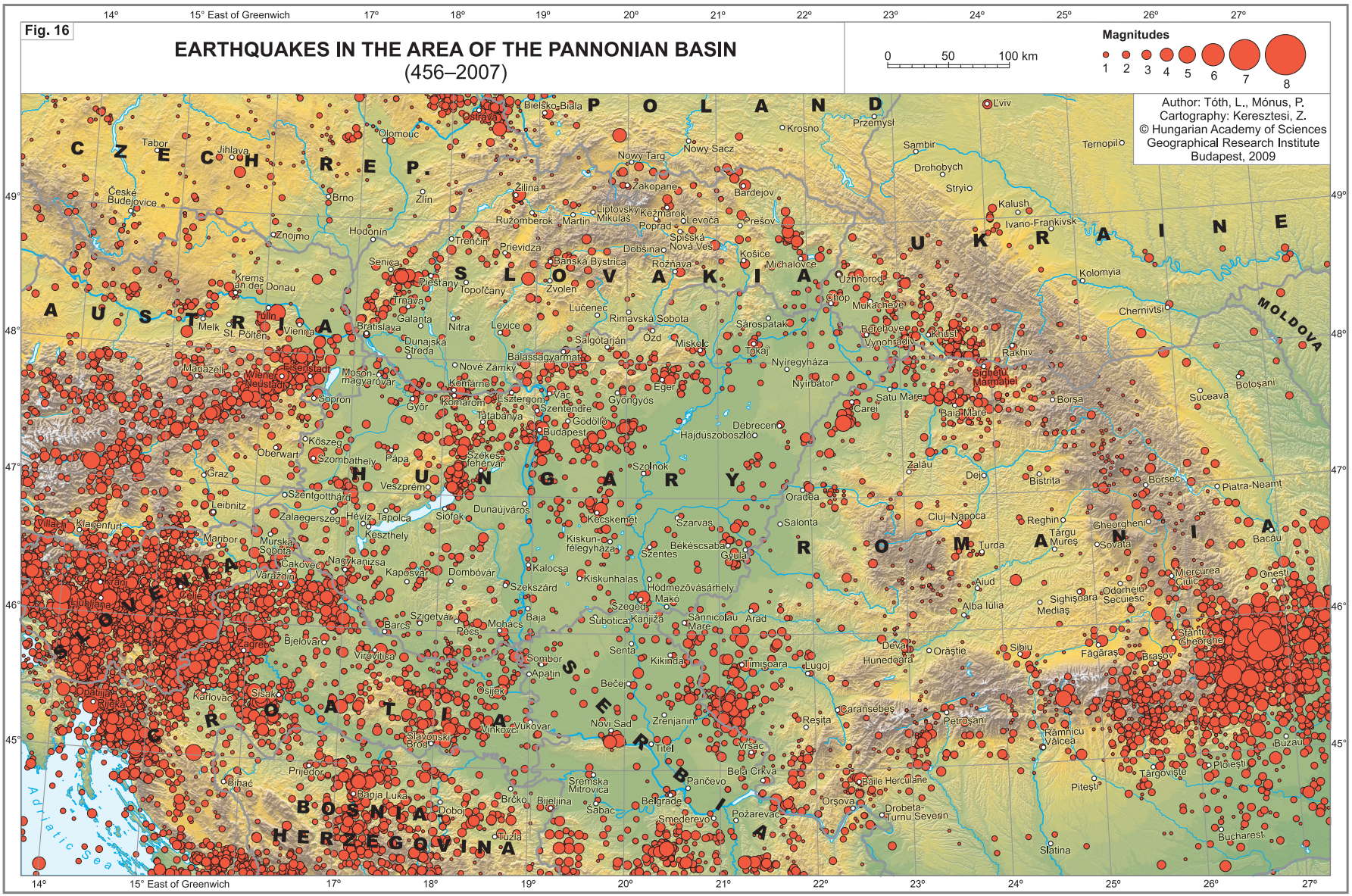


Earthquakes

The Pannonian Basin region is situated in the territory between the Mediterranean area, which is seismically one of the most active regions in the world, and the East European Platform which can be treated as nearly aseismic. At first blush, the earthquake epicenter distribu-

Fig. 16

EARTHQUAKES IN THE AREA OF THE PANNONIAN BASIN
(456–2007)



tion map suggests that there are significantly more earthquakes in the Carpathian and Dinaric tectonic belt than within the Pannonian Basin. Within the basin there also appear to be significant differences in seismicity among different geographical domains. Along the western edge of the basin and in the Eastern Alps and Dinarides some well defined zones of seismic activity can be recognised. Within the Dinaric area, seismic lineaments can be observed running parallel to the Adriatic coast. These are connected by the very active north-east–south-west trending Medvednica zone near Zagreb. A linear seismic source zone in the Eastern Alps, the Mur–Mürz–Žilina line, strikes north-east into the southern Vienna Basin and extends as far as the Little Carpathians.

The seismicity of the Vrancea region in the south-east Carpathians is characterised by an amazingly narrow epicentral region, which is confined to about 20x60 km, where strong M>6 earthquakes occur quite frequently (*Figure 16*).

Seismicity in the Pannonian Basin is more moderate compared to the peripherals and, at first glance, the distribution of earthquake epicenters shows a rather scattered pattern. It is particularly difficult to decide whether the epicenters occur at isolated places or along elongated zones. However, at several individual locations earthquakes occur repeatedly. For example, near Eger (47.9 N; 20.4 E) at least sixteen earthquakes with more than fifty significant aftershocks occurred within a time interval of some 70 years. The Komárom and Mór areas (47.4–47.8 N; 18.2 E), Jászberény (47.5 N; 20.0 E), Kecskemét (46.9 N; 19.7 E) and Dunaharaszti (47.4 N; 19.0 E) also produced significant activity over a certain, but limited period of time.

Moderate seismicity does not necessarily equate to a moderate size of earthquakes: reports of major earthquakes often refer to heavy building damage, liquefaction (e.g. 1763 Komárom earthquake, M 6.2; 1911 Kecskemét earthquake, M 5.6) and sometimes the possibility of fault rupture (e.g. 1834 Érmellék earthquake, M 6.2). These observations indicate that magnitude 6.0–6.5 earthquakes are possible but infrequent in the Pannonian Basin.

Several authors have illustrated the difficulty in constructing any meaningful geographical pattern of epicentral distribution when the statistical significance of the data is so low. Using only historical and early instrumental data, it has been very challenging to find a strong correlation between known tectonic structures and earthquakes. The recent high quality earthquake observations and locations may gradually change this situation. Comparison of historical seismicity with recent events shows that the recent earthquakes, in general, lie near to clusters of historical activity. Only a few events are exceptions, in that they appear to be unassociated with historical activity. However, clusters of stronger present day activity have been detected in the north-eastern part of the Transdanubian Mountains, close to the north-eastern coast of Lake Balaton and at the Danube Bend near Budapest.

Distribution of focal depths suggests three depth provinces where most of the events have taken place. Shallow depth within the top 20 km of the earth's crust is almost exclusive in the whole region except the Vrancea zone in the Eastern Carpathians. In the Pannonian Basin area, the majority of events occur primarily between 6 and 15 km below ground level. The earthquakes of the Vrancea region are characterised by intermediate depth seismicity. Strong earthquakes occur either in the domains of 70–110 km or 125–160 km depth.

Geology

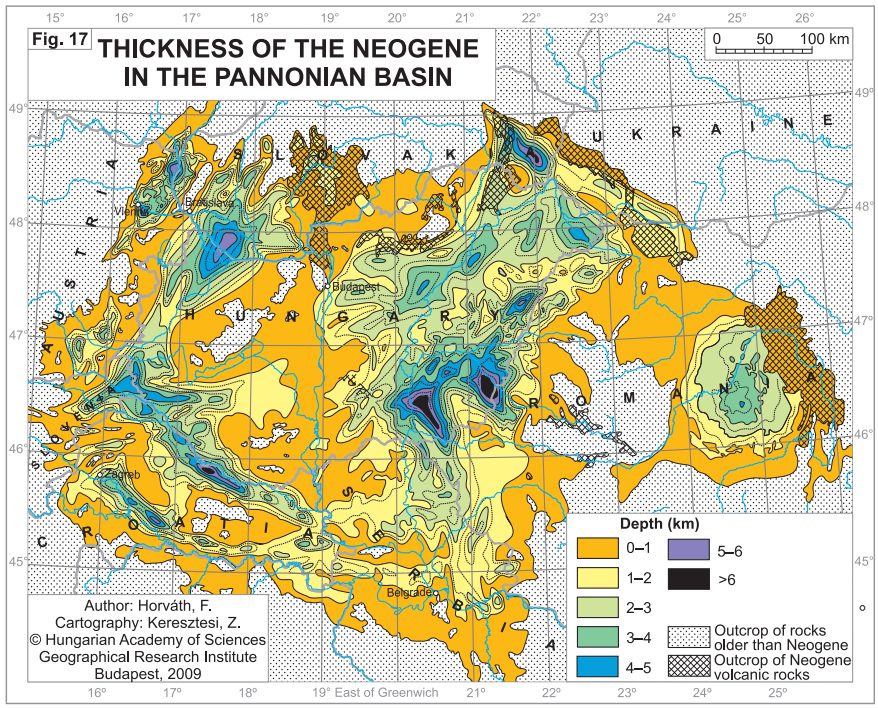
The pre-Tertiary geologic structure of the Pannonian (Carpathian) Basin exhibits a variety of effects ranging from rifting to collisional mountain building in several stages, reflecting the motions of the European and African Plates from the Palaeozoic to the Tertiary. Tertiary events led to the formation of a young basin system through crustal thinning beneath the area. The present day geologic features of Hungary, as well as those of the whole Pannonian region are determined mainly by its Late Tertiary evolution, featuring large basins over anomalously thin crust (22–32 km), a high geothermal gradient (41–56°C/km) and high surface heat flow (80–120 mW/m^2). A series of one to eight kilometre thick lacustrine, deltaic and fluviatile sediments from the Late Miocene–Pliocene Pannonian Lake filled up the large basins, now overlain by Quaternary loess, windblown sand and alluvial deposits, usually covering the surface of the plains beneath the soil (*Figure 17*).

The Pannonian Basin system actually consists of several basins, separated by ranges (inselbergs) made up of predominantly Palaeozoic, Mesozoic and Palaeogene sedimentary sequences and Tertiary igneous rocks (*Figure 18*).

Metamorphosed Palaeozoic and Mesozoic complex outcrops are found in the north-western part of Hungary, in the Sopron and Kőszeg Mountains near the Austrian border, representing the continuation of the Austroalpine ranges.

The Transdanubian Mountains, extending for 250 km in a direction of north-east to south-west, consist of hills and mountains with a great variety of geologic buildup. Lower Palaeozoic phyllite, Permian fluvial sandstones and Triassic shales and carbonates are known to exist north of Lake Balaton (the Balaton Upland), while Carboniferous granite constitutes a large part of the Velence Hills, located north-east of Lake Balaton. Other parts of the Transdanubian Mountains (Keszthely, Bakony, Vértes, Gerecse, Pilis and Buda Mountains) are mainly made up of Triassic carbonates, however, Jurassic, Cretaceous and Eocene formations also occur in the central zone of the synform, determining the basic structural pattern of these mountains.

The North Hungarian Mountains possess a very complicated geologic setting. In the north-eastern part of the region, in the Szendrő and Uppony Hills, there are outcrops of slightly metamorphosed Palaeozoic shale and carbonates. The Bükk Mountains are made up of slightly metamorphosed Upper Palaeozoic–Jurassic series and a similarly metamorphosed Jurassic sedimentary and magmatic complex, which was overthrust onto the former series. Both complexes are covered by shallow marine Eocene sedimentary rocks. Nappes of Triassic carbonates make up the Aggtelek Mountains near the Slovakian border. Other parts of the North Hungarian Mountains are mainly composed of Paleogene and Neogene siliciclastic sequences



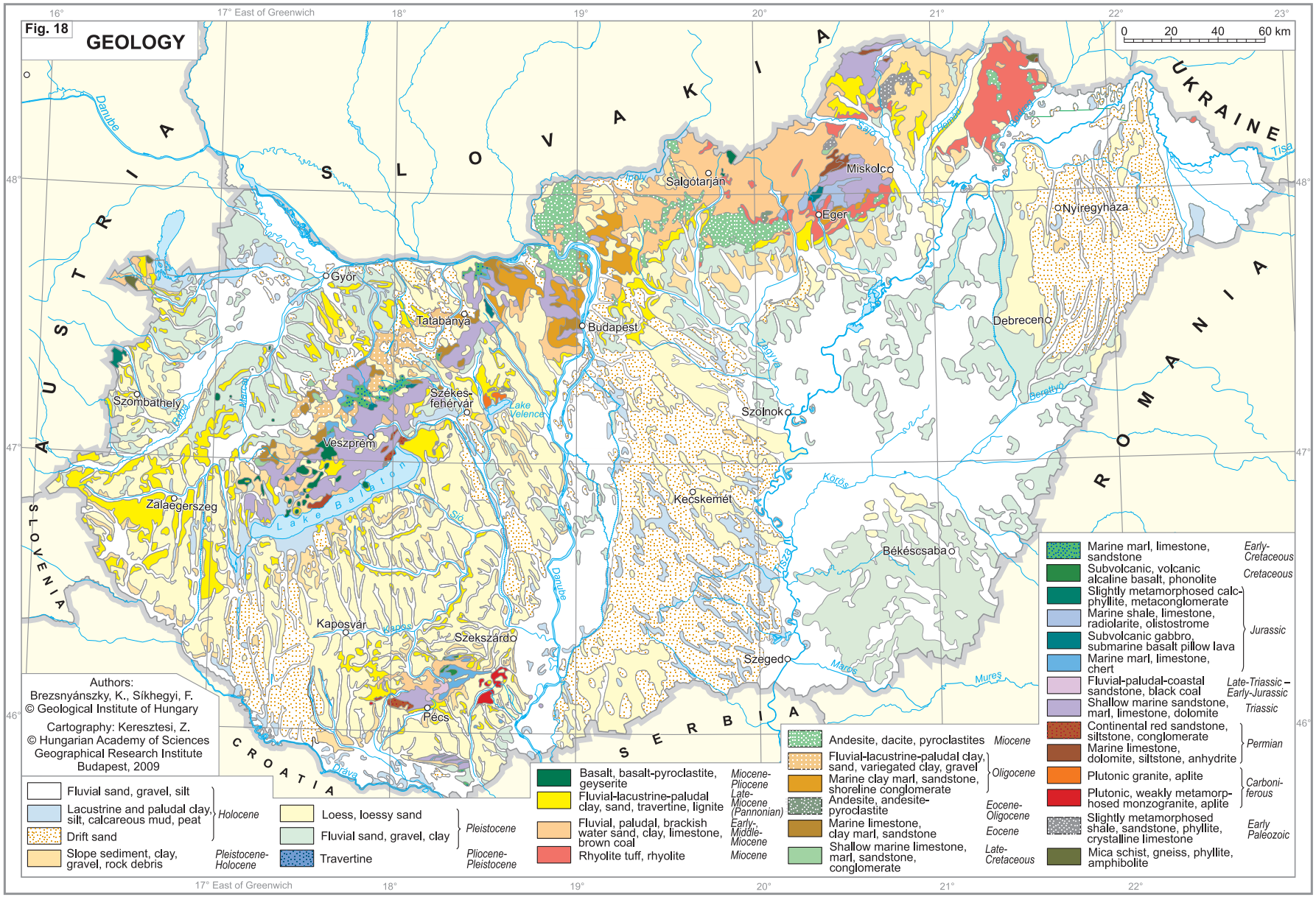


Fig. 18
GEOLOGY
0 20 40 60 km
16° 17° East of Greenwich 18° 19° 20° 21° 22° 23°
48° 47° 46°
AUSTRIA
SLOVAKIA
UKRAINE
ROMANIA
SLOVENIA
CROATIA
SERBIA
Danube
Tisza
Drava
Mura
Rába
Sió
Lake Balaton
Lake Velence
Győr
Tatabánya
Budapest
Salgótarján
Miskolc
Eger
Nyíregyháza
Debrecen
Szolnok
Székes-fehérvár
Szombathely
Veszprém
Zalaegerszeg
Kecskemét
Békéscsaba
Kaposvár
Szekszárd
Szeged
Pécs
Authors:
Brezsnyánszky, K., Síkhegyi, F.
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Fluvial sand, gravel, silt
Lacustrine and paludal clay, silt, calcareous mud, peat
Drift sand
Slope sediment, clay, gravel, rock debris
Holocene
Pleistocene-Holocene
Loess, loessy sand
Fluvial sand, gravel, clay
Travertine
Pleistocene
Pliocene-Pleistocene
Basalt, basalt-pyroclastite, geyserite
Fluvial-lacustrine-paludal clay, sand, travertine, lignite
Fluvial, paludal, brackish water sand, clay, limestone, brown coal
Rhyolite tuff, rhyolite
Miocene-Pliocene
Late-Miocene (Pannonian)
Early-Middle-Miocene
Miocene
Andesite, dacite, pyroclastites
Fluvial-lacustrine-paludal clay, sand, variegated clay, gravel
Marine clay marl, sandstone, shoreline conglomerate
Andesite, andesite-pyroclastite
Marine limestone, clay marl, sandstone
Shallow marine limestone, marl, sandstone, conglomerate
Miocene
Oligocene
Eocene-Oligocene
Eocene
Late-Cretaceous
Marine marl, limestone, sandstone
Subvolcanic, volcanic alcaline basalt, phonolite
Slightly metamorphosed calc-phyllite, metaconglomerate
Marine shale, limestone, radiolarite, olistostrome
Subvolcanic gabbro, submarine basalt pillow lava
Marine marl, limestone, chert
Fluvial-paludal-coastal sandstone, black coal
Shallow marine sandstone, marl, limestone, dolomite
Continental red sandstone, siltstone, conglomerate
Marine limestone, dolomite, siltstone, anhydrite
Plutonic granite, aplite
Plutonic, weakly metamorphosed monzogranite, aplite
Slightly metamorphosed shale, sandstone, phyllite, crystalline limestone
Mica schist, gneiss, phyllite, amphibolite
Early-Cretaceous
Cretaceous
Jurassic
Late-Triassic – Early-Jurassic
Triassic
Permian
Carboni-ferous
Early Paleozoic

and Oligocene (in the eastern Mátra Mountains), and Miocene igneous rocks (Börzsöny, Cserhát, Mátra and Tokaj Mountains).

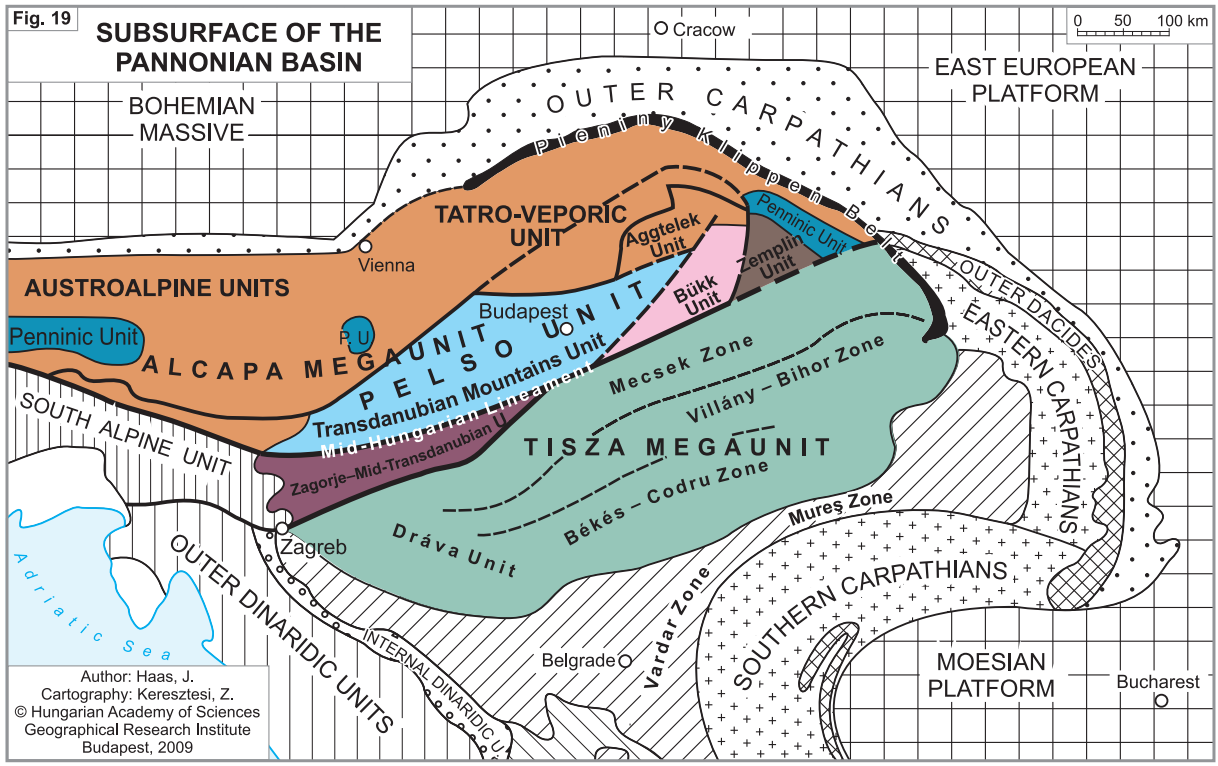
Carboniferous granites are exposed in the south-eastern part of the Mecsek Mountains in South Transdanubia. Thick Permian to Lower Triassic continental red beds and Middle Triassic carbonate sequences make up the anticline of the western Mecsek Mountains, whereas extremely thick, marine, siliciclastic Jurassic sediments and Cretaceous magmatic complexes constitute the syncline of the eastern Mecsek Mountains. Located south of the Mecsek and Villány Mountains have an imbricated structure consisting of Mesozoic carbonates.

Geophysical measurements and drilling activities carried out over the last couple of decades have revealed that beneath an ordinarily relatively thick and uniform Late Tertiary cover, the basement of the Pannonian Basin is rather complicated. It exhibits a mosaic pattern made up of heterogeneous structural elements; a collage of allochthonous terranes derived from different parts of the Tethyan realm. Moreover, these elements (structural units or terranes) were arranged in different ways during the course of the long evolutionary history of the Pannonian region. The present-day locations of these structural units are presented in *Figure 19*.

The pre-Neogene basement of the Pannonian Basin is divided into two large units by the Mid-Hungarian Lineament trending east-northeast to west-southwest. These megaunits of markedly different geologic history, namely the Tisza Megaunit (or Tisia Terrane) and ALCAPA Megaunit, were juxtaposed only during the latter stage of the pre-Neogene restructuring of the Pannonian realm in the Late Oligocene–Early Miocene (18–25 million years ago).

The Tisza Megaunit consists of blocks accreted during the Late Paleozoic Variscan orogenic phases, when it formed a part of the European Variscan Belt. It separated from this belt in the Middle Jurassic and since the late Early Cretaceous it has moved as a separate entity, i.e. a microcontinent.

The ALCAPA Megaunit is a composite terrane consisting of metamorphosed remnants of the Ligurian-Penninic Ocean (Penninic Unit) that are overthrust by elements of the European plate margin and the Adriatic microplate (Austroalpine-Tatro-Veporic Unit), respectively. The Pelso Unit is found south of this unit. It is also a composite terrane that is made up of the Transdanubian Mountains Unit, along with the Zagorje-Mid-Transdanubian, the Bükk and the Aggtelek Units. Prior to the large scale displacements, the Transdanubian Mountains Unit was



located between the South Alpine and Upper Austroalpine Units. All of these units belonged to the margin of the Neotethys Ocean. In the Zagorje-Mid-Transdanubian Unit, strongly sheared, displaced elements of the South Alpine and Internal Dinaridic Units occur. The Bükk Unit, that also contains small fragments of the oceanic basement of the Neotethys, is derived from the Dinaridic realm, together with metamorphosed formations of the Aggtelek Unit that are overthrust by nappes of the Tatro-Veporic Unit.

The main stages of structural evolution were as follows:

– The *Pre-Alpine phase*, which fits into the Palaeozoic evolutionary history of Europe. Features of the multiphase metamorphic complexes and granitic rocks point to a Central European Variscan (Moldanubian Zone) affinity of the basement of the Tisza Megaunit, whereas the lack of higher-grade metamorphism suggests a South Alpine-Dinaridic affinity of the elements of the Pelso Unit.

– The *early period of the Alpine evolutionary cycle*, prior to the main orogenic phases, that lasted from the Late Palaeozoic to the Middle Jurassic. In this period structural evolution was mainly governed by the heterochronous opening of the ocean branches, i.e. the Neotethys and the Ligurian-Penninic branch of the Atlantic Ocean, leading to a disintegration in the margins of the surrounding continental plates and a separation of microcontinents and plate fragments that would play a significant role in the further development of the region.

– The *later period of Alpine structural evolution*, lasting from the Middle Jurassic to the Early Neogene. This period witnessed a closure of the Neotethys in the Middle to Late Jurassic and the Ligurian-Penninic ocean branch during the Cretaceous to Early Tertiary. As a result of this, this interval was characterised by intensive tectonic deformations, displacements, and re-arrangements of the structural units (terranes). The terranes forming the basement of the Pannonian Basin were to be found in their present day, juxtaposed setting by the end of this stage.

– The phase that formed the Pannonian Basin was initiated by attenuation of the crust, leading to intense volcanism and significant but uneven subsidence during the Miocene. An andesite-dacite stratovolcanic chain, subparallel to the Carpathian arc was formed 16 to 13 million years ago. As a result of the unequal subsidence pattern, sub-basins filled with several kilometres thick sediment developed, which were separated by islands and ranges. About 12 million years ago, in the Late Miocene (Pannonian) subsidence of the articulated basement of the basin system continued and accelerated. Coevally, due to uplift of the Carpathian arc the connection with the Black Sea had ceased to exist and a large lake came into being, the Pannonian Lake. Parallel to the intense subsidence, basalt volcanism started in some parts of the Pannonian Basin (e.g. the Bakony-Balaton Upland and Kemenesalja) about 7.5 million years ago. Sediments derived from the uplifting Alps and Carpathians gradually filled up the lake, step-by-step through advancing deltas. By the Pliocene, in place of the former lake a fluvial-lacustrine system had established with large swamps and wetlands. 2.5 million years ago an intense uplift of Transdanubia, the western part of the Danube-Tisza Interfluve, and of the present day mountains began, whereas the subsidence of the deep basins continued, giving rise to the deposition of thick fluvial sediments during the Pleistocene. Loess is a characteristic sediment, widely found in hilly regions, on piedmonts and fluvial terraces. The thickness of the loess sequences locally reaches 100 m along the Danube.

Relief and Landscapes

Landform Evolution

Topography is one of the most important factors in the geographical environment. Its configuration, origin, as well as past, present and future development is decisive for the character and course of the evolution of drainage, soils, flora, fauna and human settlements.

The Carpathian (Pannonian) Basin configuration is emphasised by the Alps, Carpathians and Dinaric mountain ranges that provide a frame for the depression, which is still in the stage of subsidence (*Figure 20*).

The primary characteristic features of the country's topography are low relief and poor vertical dissection. Hungary's lowest point is in the vicinity of Szeged (79 metres above sea level), whereas the highest one is in the Mátra Mountains (1014 m a.s.l.).

The Carpathian Basin is oval-shaped when viewed in plan and of relatively recent origin, developing mainly in the middle and late Tertiary as a result of the folding of the surrounding framework of mountains.

At that time, the uplift of the 1,500 km long range of Carpathians began, adjoining to the Alps in the west, and to the Dinaric ranges in the south. Also, the subsidence of the Alföld (Great Hungarian Plain) started ca 7–10 million years ago.

The relief of the interior of the Carpathian Basin, formed during the last transgression, is constituted by filled-up depressions, basins, plains, dissected hills, foothills and medium-height mountains dissected into horsts. Earlier (even during the Upper Miocene), medium-height mountains were found over huge areas, in locations where nowadays only basins and hills are to be found.

The present-day medium-height mountains (e.g. parts of the Vértes, Gerecse, Mecsek or Buda Mountains) were lower and sometimes covered with Pannonian marine deposits. Intense volcanic activity commenced in the north and north-western areas of the Carpathian Basin, being at that time one of the 'hot spots' of the globe. The first rock to have formed as a result of these Miocene volcanic eruptions was the rhyolitic tuff, which covered the famous marine and terrestrial fossils of the Ipolytarnóc Nature Reserve.

Most of the mountains forming the inner Carpathian volcanic belt in Hungary were brought into existence by andesite volcanism during the Middle Miocene (e.g. the Visegrád, Börzsöny, Cserhát and Mátra Mountains) and Upper Miocene (e.g. Tokaj/Zemplén Mountains).

The surface is built of young marine, alluvial and eolian deposits and, to a lesser extent, by volcanic rocks; they disguise the events of the previous geological epochs. 73% of the country consists of lowlands and plains (up to 200 m a.s.l.), 20% of hills or foothills (mostly up to 350 m a.s.l.) and 7% of the territory is occupied by medium-height mountains (lower uplands to 750 m a.s.l. and mountains up to 1,014 m a.s.l.) and their valleys.

The present configuration of the topography was shaped during the past five and a half million years, and mostly in the Quaternary. More than three-quarters of Hungary is built up of loess and loess-like deposits, alluvial fans, talus cones, fluvial gravel and thick sand sequences; all related to the Pliocene and Pleistocene climate changes.

The travertines and landforms in karstifying rocks (e.g. caves in the Bükk Mountains, Aggtelek Karst in north-east Hungary or in the north-eastern part of the Transdanubian Mountains) developed mainly during these times.

In the middle of the Pleistocene (350–400 thousand years ago), during the Lower Paleolithic the first groups of the prehistoric people appeared in these areas (e.g. in the village of Vértesszőlős, on the Castle Hill of Buda and on the Kender Hill in Pilis Mountains).

Major Landscape Units

The present-day territory is divided into six physiographic macroregions: the Alföld (Great Hungarian Plain), the Kisalföld (Little Hungarian Plain), the West Hungarian Borderland, the Transdanubian Hills, the Transdanubian Mountains and the North Hungarian Mountains with its inter- and intramontane basins (*Figure 21*).

The largest landscape unit of the Carpathian Basin is the ***Alföld*** with a total territory of 100,000 km^2 of which 52,000 km^2 belong to Hungary. Its surface is made up of wide flood plains and alluvial fans of the interfluves. From the latter the Nyírség, the Maros Plain and the sandy plain on the *Danube–Tisza Interfluve* are the most important. Among them, the latter is the largest mesoregion of the country, where the landscapes were mainly formed by wind-blown sand. Here the deep subsurface sediments are the (100–800 m thick) deposits of the Danube. Out of these alluvial fans the *Nyírség* is the most diversified in terms of landforms, where the windblown sand was stabilised by the planting of acacias, fruit trees and tobacco.

The sandy plains merge into fertile loessic regions with chernozem soils, highly suitable for agricultural production. One of them is the *Hajdúság*, extending in a north to south direction and lying 30–50 m higher than the neighbouring grassy steppe of Hortobágy. The greatest extent of loess cover is to be found on the *Bácska* plateau in the South Alföld. In the Transdanubian part of the Alföld lies the *Mezőföld*, a plain thickly covered by loess, which rises 50–60 m above the Danube floodplain. Here one can find the famous loess exposure at Paks, which is a record of the climate changes during the Pleistocene.

The ***Kisalföld*** depression is bordered by the Transdanubian Mountains, the North-Western Carpathians and the Eastern Alps. Its territory is divided by the main branch of the Danube. The greater part of it (north of the river as *Danubian Lowland*) belongs to Slovakia, the rest (5,500 km^2) is situated in Hungary. Its basin-like features are: a flat, plain-like character; unconsolidated deposits of gravel, clay and sand; centripetal drainage in relation to the Danube; broad flood-plains; and the groundwater table lying near the surface. Between Bratislava (Pozsony) and Komárom (Komárno) alluvial gravel and sandy deposits from the Danube accumulated in a thickness of between 1,000 and 2,000 m, and they serve as an abundant source of potable water. The flood-plain accumulated by the Danube and its tributaries turns into slightly dissected, eroded lowlands and plains of medium elevation with terraces and outlier towards the marginal regions of the Kisalföld.

The Kisalföld is bounded to the west by the ***West Hungarian Borderland*** physiographic macroregion, including the isolated blocks of the crystalline range of the Eastern Alps: the *Sopron/Ödenburg Mountains*, the *Kőszeg/Güns Mountains* (with the highest peak in Transdanubia, Írott-kő/Geschriebenstein, 882 m a.s.l.) and *Vas Hill/Eisenberg*. The 'Hungarian Alps' descend to the gravel-covered alluvial plain of Vas-Sopron through foothill slopes.

The 200 km long and 30–50 km wide ***Transdanubian Mountains***, a block-faulted range of south-west–north-east strike, consists mostly of Mesozoic limestone and dolomite rocks, and a series of karstic horsts. This upland covering 7,000 km^2 between the depressions of the Kisalföld and the Alföld, is generally of low elevation, averaging between 400 and 500 m a.s.l.

Between the chain of horsts of the Transdanubian Mountains, hills and intermontane basins covered by Tertiary deposits are to be found. The former tropical peneplanes, faulted and broken up by tectonic movements and covered with thick laterite debris, bauxite and karstic formations, were uplifted to different heights. During this period horsts, graben structures and basins were formed partly by deflation, which also shaped the famous basalt-capped buttes of the Tapolca Basin (e.g. Badacsony and Szentgyörgy-hegy).

The *Bakony* is the highest group of the Transdanubian Mountains between Lake Balaton and the Kisalföld. It consists of flat-topped fragments elevated to a level of 200–700 m. Other important units of this mountain chain are the *Vértes* (480 m), the *Gerecse* (634 m), the *Pilis* (756 m) and the *Buda* Mountains (527 m). The most important mineral resources of this area are bauxite, brown coal and the thermal waters.

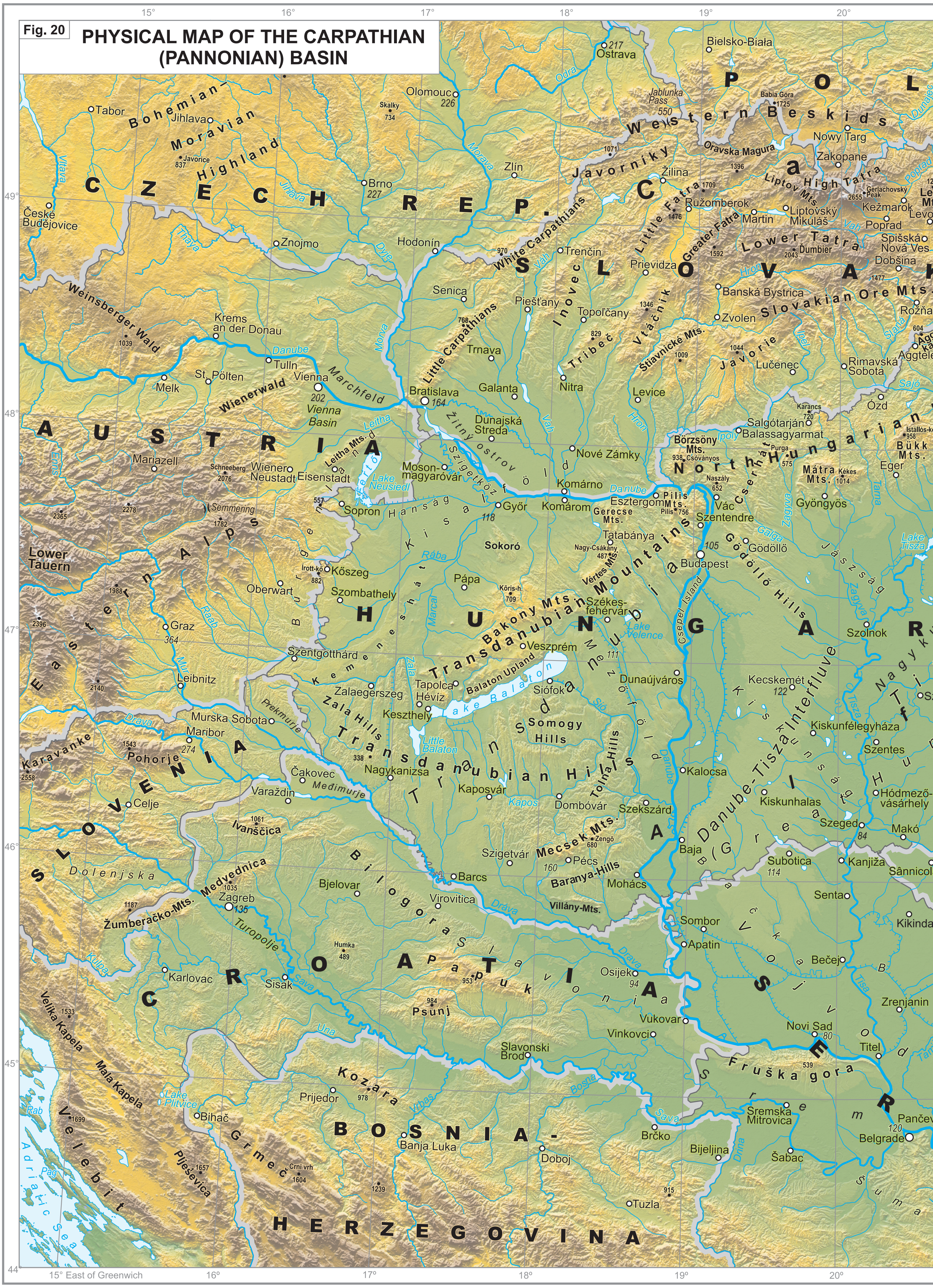


Fig. 20 PHYSICAL MAP OF THE CARPATHIAN (PANNONIAN) BASIN

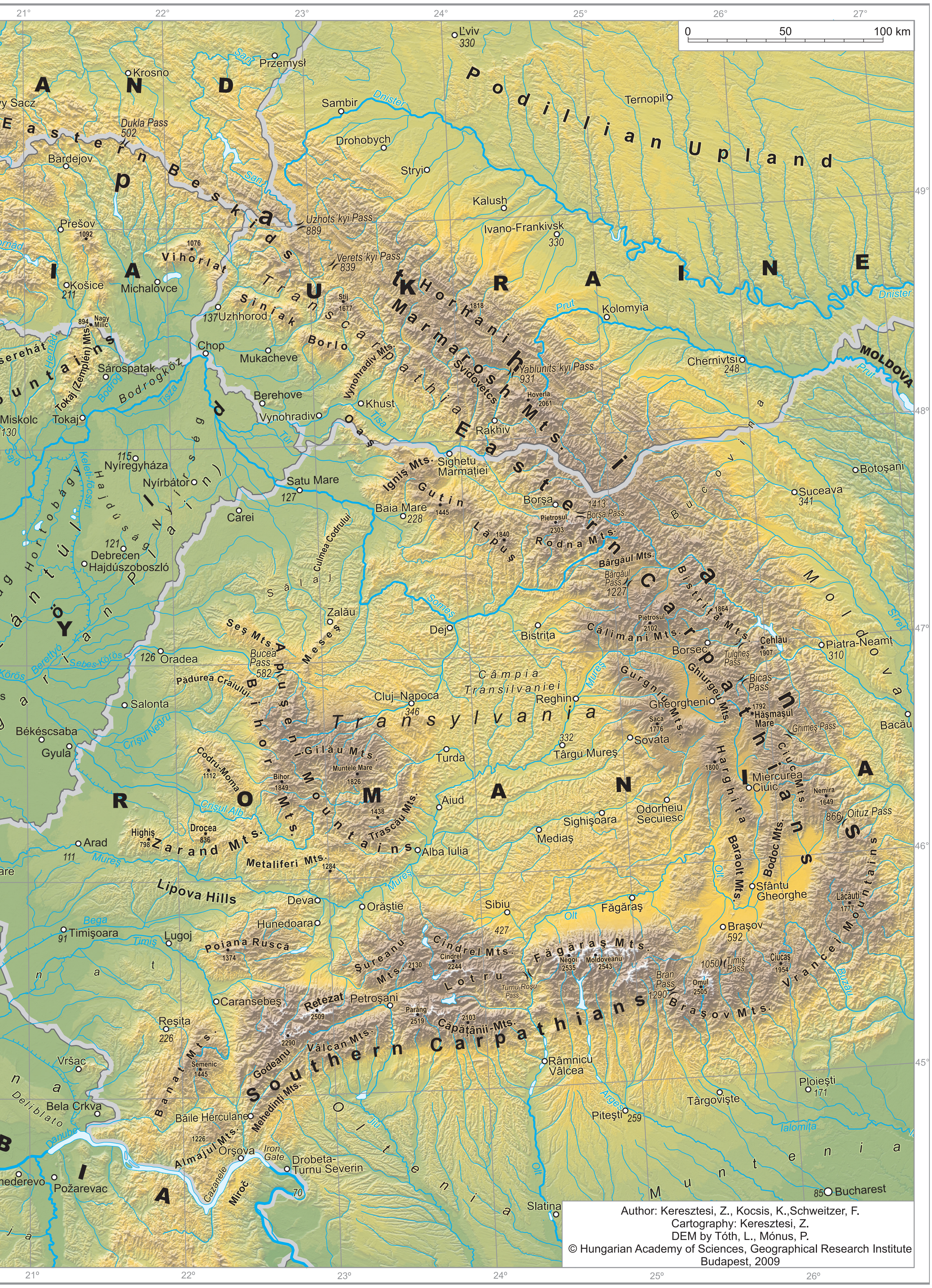

0 50 100 km
Podillian Upland
UKRAINE
MOLDOVA
ROMANIA
Eastern Beskids
Transcarpathia
Horhany
Marmarosh Mts.
Eastern Carpathians
Southern Carpathians
Transylvania
Câmpia Transilvaniei
Apuseni Mountains
Bihor Mts.
Zarand Mts.
Metaliferi Mts.
Lipova Hills
Poiana Rusca
Făgăraş Mts.
Lotru
Cindrel Mts.
Şureanu Mts.
Retezat
Căpăţânii-Mts.
Vâlcan Mts.
Godeanu
Mehedinţi Mts.
Banat Mts.
Almajul Mts.
Braşov Mts.
Vrancei Mountains
Bucovina
Moldova
Oltenia
Muntenia
Rodna Mts.
Călimani Mts.
Gurghiu Mts.
Harghita
Ciuc Mts.
Baraolt Mts.
Bodoc Mts.
Lăpuş
Gutin
Igniş Mts.
Oaş
Borlo
Siniak
Vihorlat
Sălaj
Meseş
Culmea Codrului
Bârgăul Mts.
Bistriţa Mts.
Ghurgeu Mts.
Gilău Mts.
Trascău Mts.
Codru-Moma
Pădurea Craiului
Seş Mts.
L'viv 330
Przemyśl
Krosno
Sambir
Drohobych
Stryi
Kalush
Ivano-Frankivsk 330
Ternopil
Kolomyia
Chernivtsi 248
Botoşani
Suceava 341
Piatra-Neamţ 310
Bacău
Bardejov
Prešov
Košice 211
Michalovce
Uzhhorod 137
Chop
Mukacheve
Berehove
Vynohradiv
Khust
Rakhiv
Sighetu Marmaţiei
Satu Mare 127
Carei
Baia Mare 228
Borşa
Dej
Bistriţa
Zalău
Oradea 126
Salonta
Békéscsaba
Gyula
Arad 111
Deva
Hunedoara
Orăştie
Alba Iulia
Aiud
Turda
Cluj-Napoca 346
Reghin
Târgu Mureş 332
Sovata
Gheorghenic
Borsec
Miercurea Ciuic
Odorheiu Secuiesc
Sighişoara
Mediaş
Sibiu 427
Făgăraş
Braşov 592
Sfântu Gheorghe
Timişoara 91
Lugoj
Caransebeş
Reşita 226
Vršac
Bela Crkva
Băile Herculane
Orşova
Drobeta-Turnu Severin
Požarevac
Petroşani
Râmnicu Vâlcea
Piteşti 259
Târgovişte
Ploieşti 171
Bucharest 85
Slatina
Miskolc 130
Tokaj
Sárospatak
Nyíregyháza 115
Nyírbátor
Debrecen 121
Hajdúszoboszló
Dukla Pass 502
Uzhots'kyi Pass 889
Verets'kyi Pass 839
Yablunits'kyi Pass 931
Hoverla 2061
Pietrosul 2303
Borşa Pass 1413
Bârgăul Pass 1227
Pietrosul 2102
Tulgheş Pass
Ceahlău 1907
Bicas Pass
Hăşmaşul Mare 1792
Ghimeş Pass
Saca 1776
Nemira 1649
Oituz Pass 866
Lăcăuti 1777
Ciucaş 1954
Timiş Pass 1050
Omul 2505
Bran Pass 1290
Negoi 2535
Moldoveanu 2543
Turnu Roşu Pass
Parâng 2519
Cindrel 2244
Retezat 2509
Semenic 1445
Bucea Pass 582
Bihor 1849
Muntele Mare 1826
Drocea 836
Highiş 798
Iron Gate
Dniester
Prut
Tisa
Mureş
Someş
Olt
Jiu
Argeş
Ialomita
Danube
Siret
Buzău
Bega
Timiş
Author: Keresztesi, Z., Kocsis, K.,Schweitzer, F.
Cartography: Keresztesi, Z.
DEM by Tóth, L., Mónus, P.
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Fig. 21
GEOMORPHOLOGY
MORPHO-STRUCTURAL LANDFORMS
PLAINS
Low flood plain, valley bottom
Low flood plain, peaty backswamp
Flood-free lowland
Lowland of alluvial fan covered by loessy silt
Plain with low terraces
Enclosed small basinal plain
Alluvial plain with low terraces
Lowland of alluvial fan covered by loess
Undulating loessy plain with dells
Undulating sandy plain
Sandy plain with dunes
HILL REGIONS
Foothill surface, slope dissected by valleys of erosion and derasion
Foothill surface of higher level, hill ridge, dissected by valleys of erosion and derasion
Hill ridge of higher level heavily dissected by valleys of erosion and derasion
Intramontane hill basin, tectonic basin remodelled by erosion
Intramontane elevated hill region, heavily dissected
MOUNTAINS
Truncated block mountain of metamorphic rocks
Buried planation surface
Truncated granite horst in foothill position
Partly buried granite pediment
Karst horsts, with planation surfaces on Alpine structures
Low upland (< 750 m)
Upland (750–1014 m)
16°
17° East of Greenwich
18°
19°
48°
47°
46°
KISALFOLD (LITTLE HUNGARIAN PLAIN)
WEST HUNGARIAN BORDERLAND
TRANSDANUBIAN MOUNTAINS
TRANSDANUBIAN HILLS
GREAT HUNGARIAN PLAIN
Lake Neusiedl
Lake Balaton
Lake Velence
Danube
Budapest
Tatabánya
Székesfehérvár
Veszprém
Szombathely
Zalaegerszeg
Kaposvár
Szekszárd
Dráva
ENDOGENIC FORMS
Remnant of volcanic crater
Remnant of caldera
Remnant of volcanic cone
Laccolith
Maar (mud volcano) remnant
Monogene volcanic cone
Volcanic dyke
Graben
Horst
Fault-scarp
EXOGENIC FORMS
FLUVIAL FORMS
Oxbow lake, infilled meander
Alluvial fan at the flood-plain level
Dammed-off small basin
Truncated, isolated spur, erosional scarp
Terrace residual
River capture, wind gap
Steep-sided valley, high grad.
Convex valley, medium gradient
Shallow valley with flat floor
Asymmetric valley
Asymmetric erosional-derasional valley
Asymmetric river valley
Gorge
Terraced valley
Terrace No. II a
Terrace No. II b
Terrace No. III
Terrace No. IV
Terrace No. V
Terrace No. VI
Terrace No. VII
Holocene alluvial fan
Upper Pleistocene alluvial fan
Middle Pleistocene alluvial fan
Lower Pleistocene alluvial fan
Undercut steep slope
Stable steep slope
Valley device
EOLIAN FORMS
Sand dune
Parabolic dune
Longitudinal dune, covered by thin loess
Sand dune on river bank
Blow-out dune, deflational depression


Authors: Ádám, L., Borsy, Z., Góczán, L., Juhász, Á., Láng, S., Marosi, S., Pécsi, M., Pinczés, Z., Schweitzer, F., Somogyi, S., Székely, A., Szilárd, J., and co-workers
Cartography: Keresztesi, Z., Rátóti, B., Sziládi, J.
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0 20 40 60 km
Volcanic mountains
Low upland (< 750 m)
Upland (750–1014 m)
EROSIONAL LANDFORMS CONTROLLED BY TECTONICS
Lake and lake basin
Valleys in hill countries and mountains
NORTH HUNGARIAN MOUNTAINS
GREAT HUNGARIAN PLAIN
SOUTH HUNGARIAN MOUNTAINS
Sátoraljaújhely
Eger
Nyíregyháza
Debrecen
Szolnok
Kecskemét
Békéscsaba
Szeged
AGE OF LANDFORMS
T Tertiary and older
T1 T2 Early and late Tertiary
M Miocene undistinguished
P1 P2 Lower and Upper Pannonian
P Pliocene landforms undistinguished
P3 Upper Pliocene
Q Quaternary landforms undistinguished
Q1 Q2 Q3 Lower, Middle and Upper Pleistocene
H Holocene landforms undistinguished
H1 H2 Early and late Holocene
Q1 - Q3 Degradational landforms
Q3 + H Aggradational landforms
GEOMORPHOLOGICAL SURFACES OF NEOGENE VOLCANIC MOUNTAINS
vp1 Summit level, plateau
vp2 Upper level of lateral ridges
vp3 Lower level of lateral ridges
POSITION OF EROSIONAL SURFACES OF HORST AND BLOCK MOUNTAINS
t1 Erosional surface of horst in summit position
t2 Erosional surface (Cr3) of horst covered by Tertiary sediments
t3 Exhumed horst surface with remnants of Tertiary sediments
tk Cretaceous planation surface sunk into threshold or foothill position (pedimented in Neogene)
te Downfaulted and buried planation surface (Cr3) in graben position
MAN-MADE LADFORMS
Important loess exposure
Important quarry
Large spoil heap
Levee of significant size
Cut of significant size
Settlement
LACUSTRINE, PALUDAL FORMATIONS
Shallow depression with peat and clay
TYPICAL RIVER SECTION
H: Predominantly aggradation
Kf: Meandering and aggradation
E: Near equilibrium (graded section)
Kb: Meandering and incision
B: Predominantly incision
200 Characteristic altitude (in meters)
KARST FORMS
Karst landforms in general
Doline fields
Significant cave
Hydrothermal karst phenomena
Ponor (Stream-sink)
LANDFORMS OF PLANATION, EROSION AND MASS MOVEMENT
Scarp due to erosion, derasion and bedrock structure
Mountain rim, fault scarp modified by planation
Smoothed scarp due to erosion and planation
Small stepped bench, carved by cryoplanation
Raised marine terrace
Margin of the foothill surface
Erosional basin
Erosional valley, dell
Outlier (butte, monadnock)
Unstable slope, landslide
Alluvial fan of ephemeral stream in piedmont area
20° 21° 22° 23°
48° 47° 46°

The latter are common at Hévíz, Zalakaros, Tapolca, Balatonfüred in the Balaton region, and in Budapest.

The ***North Hungarian Mountains***, the country's most diversified and highest upland mainly constitute a part of the inner volcanic belt of the Western Carpathians. The majority of their territory (10,000 km^2) comprises remnants of Miocene strato-volcanoes, while the remainder belong to Mesozoic block mountains. The volcanic mountains around the Danube Bend – *Visegrád* Mountains (reaching 700 m) and the *Börzsöny* (elevating above 900 m) – lifted up in the Middle Miocene, whilst in the east the *Tokaj/Zemplén Mountains* (800 m) resulted from Upper Miocene volcanism. The *Börzsöny*, *Cserhát* and *Mátra* (with the highest Hungarian peak, the Kékes, 1014 m) consist mostly of andesite and tuffs. Along the southern foothills of the Bükk Mountains and in the Tokaj/Zemplén Mountains rhyolite gradually gains in proportion.

Between the volcanic mountains, the faulted and folded Mesozoic block mountains developed, which constitute the most typical karstic landforms of Hungary, e.g. the *Aggtelek (or Gömör-Torna) Karst* and the Bükk Mountains. The nearly 24 km long system of caves of the Aggtelek and Slovak Karst were added to the UNESCO World Heritage List in 1995. In the *Bükk* 1,115 caves have been discovered, including István-lápa (the deepest cave in Hungary, 254 m), the archaeologically important Szeleta and Subalyuk caves, and the Cave Baths (a prominent tourist attraction of Miskolc-Tapolca). The central core of the Bükk, a heavily faulted and folded block range is the largest and most beautiful limestone table of the country.

The ***Transdanubian Hills*** are situated between Lake Balaton, the Alföld, and Dráva and Mura rivers. These hills reach an average height of 200 to 300 m a.s.l. and have subsurface deposits of Quaternary fluvial gravel and sand, which are in turn covered with a blanket of Pleistocene loess with a thickness of 10–50 m. Below this, Pannonian marine clay and sand (2,000–3,000 m thick in some places) can be found, covering a crystalline and Mesozoic rock basement. The western part of this hilly region features parallel ridges and meridional (north to south) valleys. In the east the surface is articulated by faults running north–northwest, south–southeast; along these structural lines valleys have developed. From this hilly environment rise the mostly Mesozoic, karstic limestone mountains and horsts ('inselbergs'): the *Mecsek* (682 m a.s.l.) and the *Villány* Mountains (442 m a.s.l.). In the southern foreland of the eastern Mecsek is situated the loess covered granite block of *Mórágy Hills*.

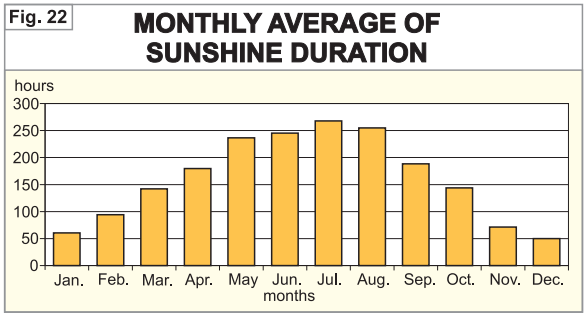
Climate

Hungary's climate is influenced by its latitudinal position, location of the country amidst a belt of westerly winds, the cyclonic activity of the temperate climate zone, and finally by its distance from the Eurasian continental interior, the Atlantic Ocean and the Mediterranean Sea. Due to these factors the climate of the country shows large variability. Despite the small territory and the relatively low relief, regional differences can be significant. Hungary is under the varying influence of the continental, oceanic and Mediterranean climates, any of which could be temporally dominant. The Carpathians, Alpine and the Dinaric mountain ranges are high enough to substantially modify the flow of air masses.

Sunshine

The quantity of annual sunshine varies between 1,750 and 2,050 hours, and the spatial distribution shows a north-west–south-east gradient. The monthly values for the countrywide average are between 50 and 260 hours (*Figure 22*).

Fig. 22



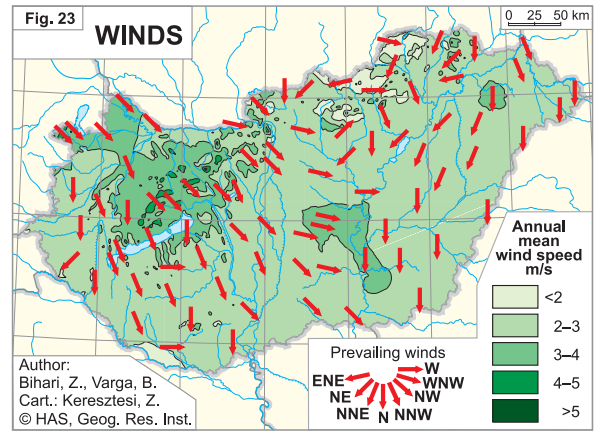
The annual course is similar to that of temperature, but there are small differences according to the effects of cloud cover. The absolute maximum of annual sunshine hours was 2,501 hours (in 2003) in the south-east and the absolute minimum was 1,398 hours (in 1972), which occurred in the north-western part of the country. In spite of that, the longest period with no sunshine was in the south-eastern region (35 days).

The fast development of automatic weather stations has reduced the manual measurement of sunshine duration, and at present they are substituted by global radiation measurements. The annual values fluctuate between 4,500 and 4,800 MJ/m^2 in most of the country.

Winds

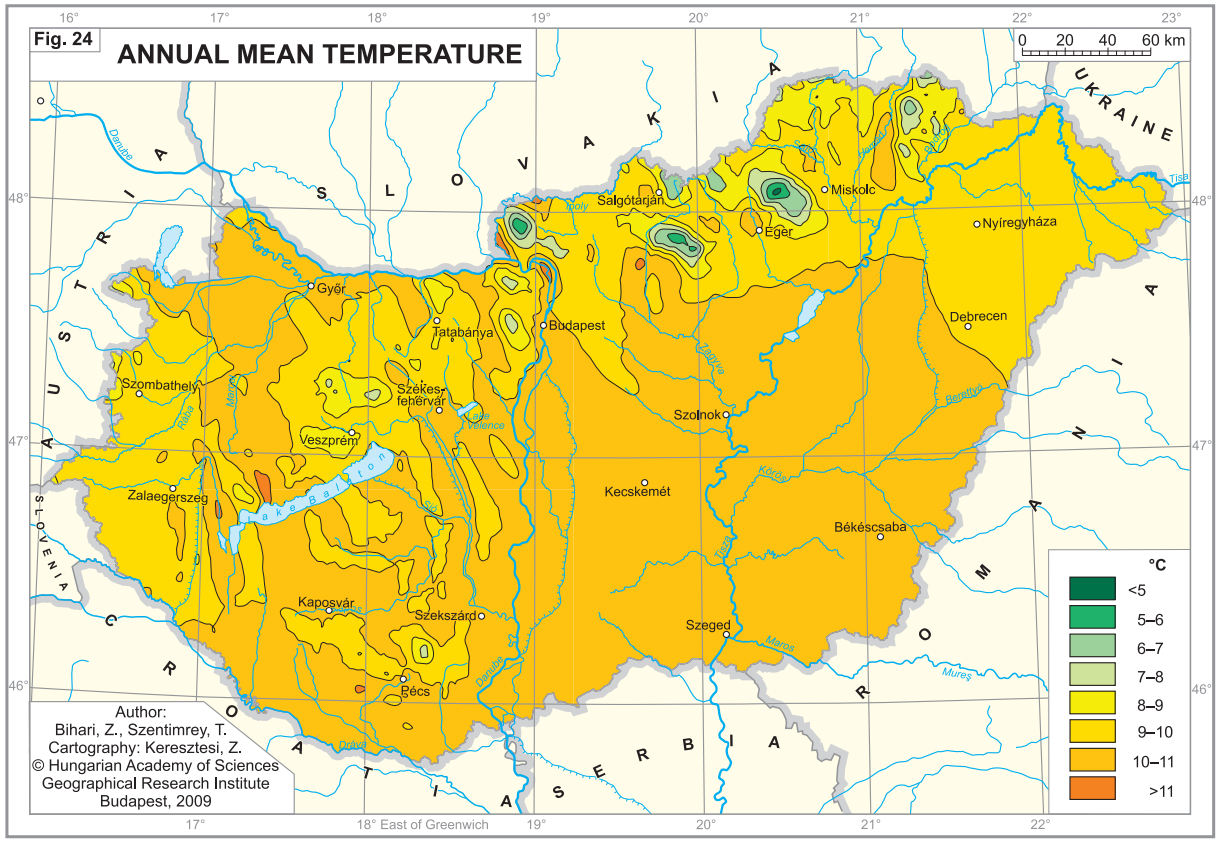
The prevailing wind direction would be north-westerly without the effect of orography (*Figure 23*). The highest wind speeds generally occur before Easter, and are therefore called Lent-winds. Stronger winds cross the mountains and have north-westerly and northerly directions; other air masses are deflected, and cross the mountains at passes or other lower parts of the Carpathians, and they could even have an easterly component. This is mostly characteristic of the north-eastern part of the country. The secondary maxima of wind direction have a southerly component almost everywhere (orographical effect). The wind speed is relatively low (2–4 m/s annual average) because of the basin effect. In spite of this, wind has lately been increasingly used for the purposes of electricity generation. The maximum measured wind gust

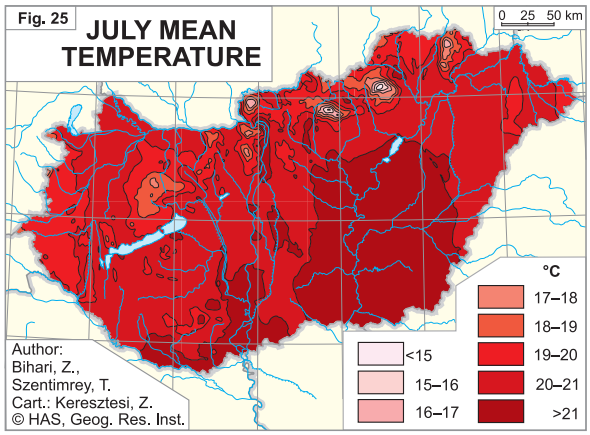
has been 44.5 m/s, but only rough estimations exist about the wind speeds in tornados, that have been observed with increasing frequency in recent times.

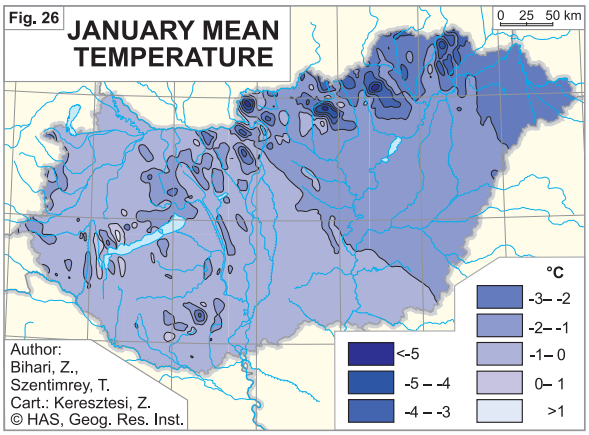


Temperature

The annual mean temperature has a north-west–south-east gradient, slightly modified by local topography (*Figure 24*). It had already reached 11°C in some places in the south of the country and on the south-western slopes during the 1971–2000 period. The country predominantly exhibits an annual average of between 9–11°C. The map illustrating the annual temperature average clearly shows the influence of local topography. Climatologically, the coldest month is January







and the warmest is July, although in certain cases, any of the winter months can be the coldest and generally July or August is the warmest.

July's mean temperature is more than 21°C in the southern part of the country, over large areas of the Alföld (Great Hungarian Plain), and on southern and south-western slopes of mountains (*Figure 25*). Only small tracts with higher elevation show values below 17°C. Significantly cooler areas can be found in the North Hungarian Mountains. Convective motions are important in summer, therefore the latitudinal distribution of temperature is less influenced by large-scale horizontal flows.

The absolute maximum recorded temperature was 41.9°C on 20 July 2007. The warmest period of the year is the end of July and very early August, the coldest around the second week of January. The long-term mean temperature for January is sub-0°C practically all over the country (*Figure 26*). The distribution of the mean temperature shows a clear south-west–north-east gradient that is a consequence of the warming effect of the Mediterranean Sea and the cooling effect of the Siberian anticyclone.

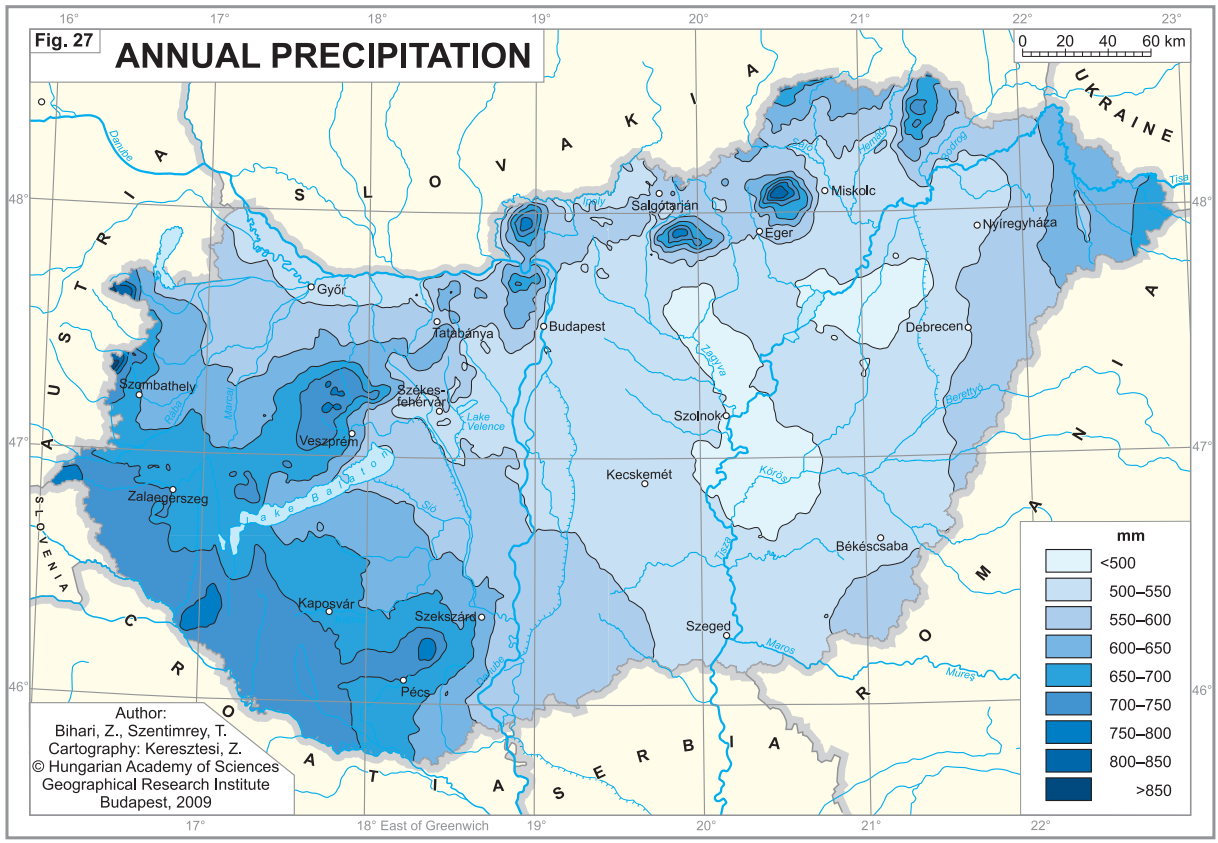
The influence of topography is evident, but the vertical temperature gradient is more complicated. Inversions occur frequently in winter, when the temperature does not decrease with altitude, it rather increases up to the height of the inversion. The cold air pillow has an influence on the vertical temperature gradient; it is not unknown for areas with higher elevation to be warmer, because they are already out of the cold air mass on the bottom of the Carpathian Basin.

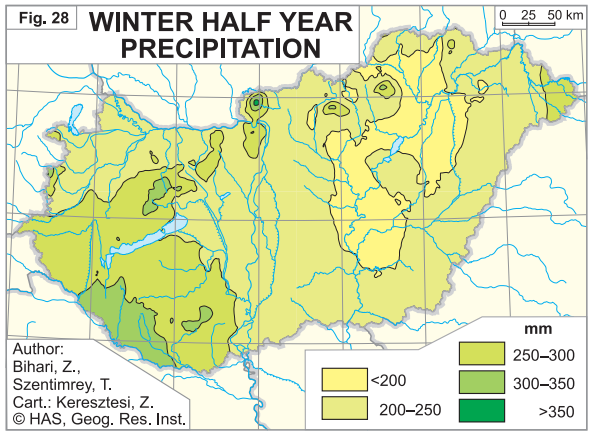
Precipitation

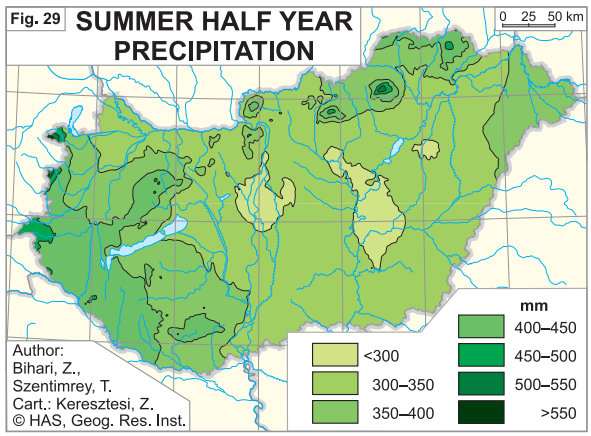
Precipitation shows large temporal and spatial variability. Monthly precipitation could be zero in any month and at any place, but it could equally be near to, or above 200 mm. The lowest amount of monthly precipitation recorded countrywide was 1.8 mm (February 1998) and the highest was 178 mm (August 2005). The year-to-year variability of annual precipitation is significant and has probably had a stronger impact on nature and the economy thus far, than its downward trend during the 20th century.

The absolute maximum daily precipitation sums used to be at least about 100 mm. The heaviest daily precipitation ever recorded was 203 mm and the largest estimated daily amount is 260 mm. The climate of Hungary is not warm enough to produce long lasting heavy rains. Larger amounts of daily precipitation as a rule not only have thermal triggers, but topographical reasons as well. Recently, there has been a greater incidence of flash floods, probably partly caused by the growing precipitation intensity. The annual precipitation figures show a south-west–north-east gradient, which is the effect of the Mediterranean Sea. Its amount varies mostly between 500 and 750 mm (*Figure 27).*

Summer is the wettest season and winter is the driest one. But winter precipitation is as







important as that of summer due to the higher seasonal storage capacity of the soil. The most frequent precipitation quantity is 200–300 mm in the six months of the winter season and 300–400 mm in the remaining spring and summer months (*figures 28 and 29*).

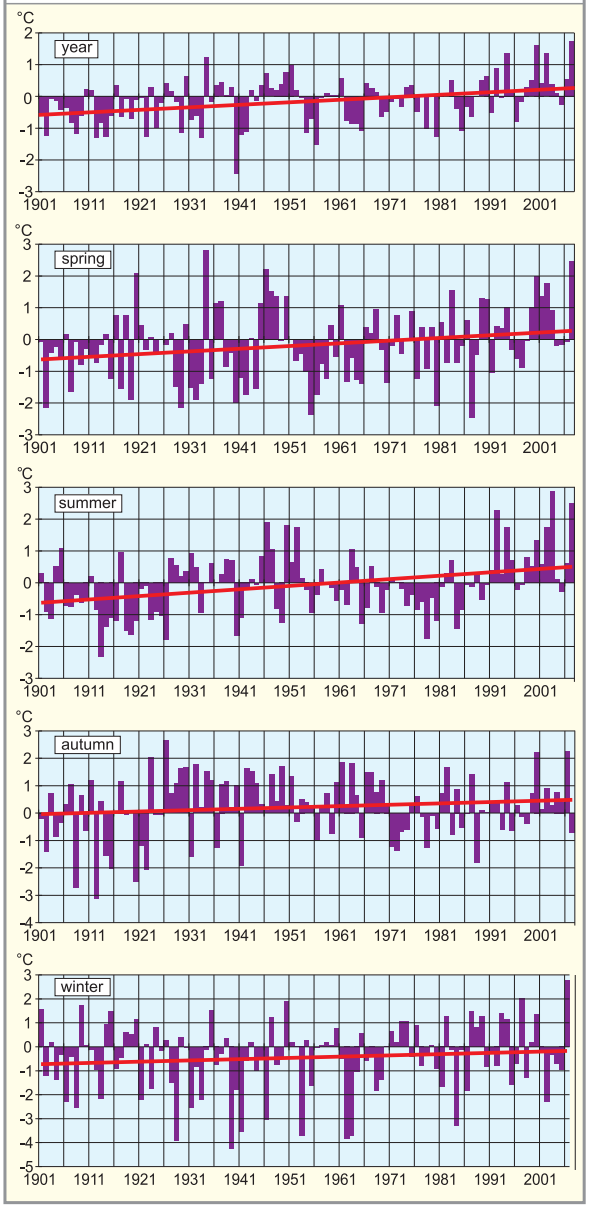
The spring and summer period offers a much more fragmented picture because of the large amount of convective precipitation. The increasing temperature reduces the snow/rain ratio in winter and it adds to the precipitation intensity, especially in the summer, further deteriorating the surface water balance and water supply situation.

The recent frequency with which floods and droughts have been occurring is alarming. Flood and drought events could happen in the same location, and even in the same year. The Tisza valley often suffers from both.

Long-Term Temperature and Precipitation Trends

Hungary is largely affected by climatic warming trends. There has been a significant increase in temperature in each season (*Figure 30*), but statistically, these have been for different reasons. The summer season has been warming most notably (by 1.12°C since 1901), and the main factor behind this steepest linear trend among the seasons has been the recent hot summers. The winters have warmed the least (by 0.42°C since 1901), and their warming can be explained by the disappearance of serious cold snaps by the end of the 20th century, with temperatures averaging near to those in the period between 1971 and 2000. Autumns were cold at the beginning of the studied period, and warm in the mid-20th century. Springs have shown a similar tendency to summers, with lower values of positive anomalies.

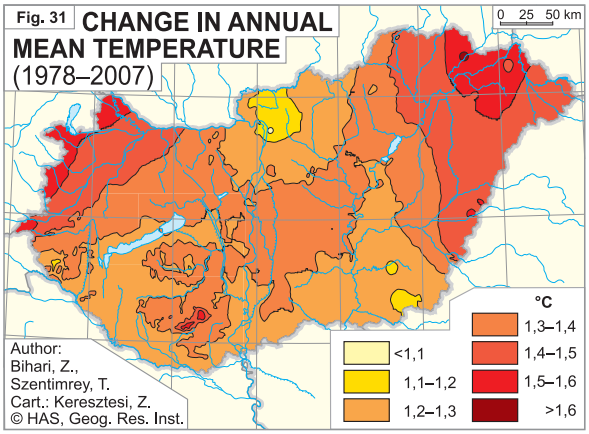
Fig. 30 ANNUAL AND SEASONAL MEAN TEMPERATURE ANOMALIES WITH LINEAR TREND 1901–2007, RELATIVE TO 1971–2000 MEAN



Warming has accelerated since the mid-70s, but its significance is relatively low because of the short time period, although it has been 2–3°C over the last 30 years (*Figure 31*). In line with the warming tendency, heat waves occur with ever greater frequency. They could be observed at the beginning of the 20th century, but practically disappeared during a cooling phase from first half of the 50s until the mid-70s and became increasingly frequent from the mid-80s onwards. Nowadays, heat waves are a common feature of the Hungarian climate.

Another indicator of a warming climate is the positive anomaly in mean monthly temperatures. 12 consecutive months had positive temperature anomalies from September 2006 until August 2007. This long, warm period (with average temperatures about 2–3°C higher than the 1971–2000 long-term average) makes the natural environment and humans much more sensitive to less than average precipitation. Increasing temperatures and decreasing precipitation levels are the characteristic features of basic Hungarian climate trends, therefore the changes are more appropriate to the South European region than alternative locations along the same latitude.

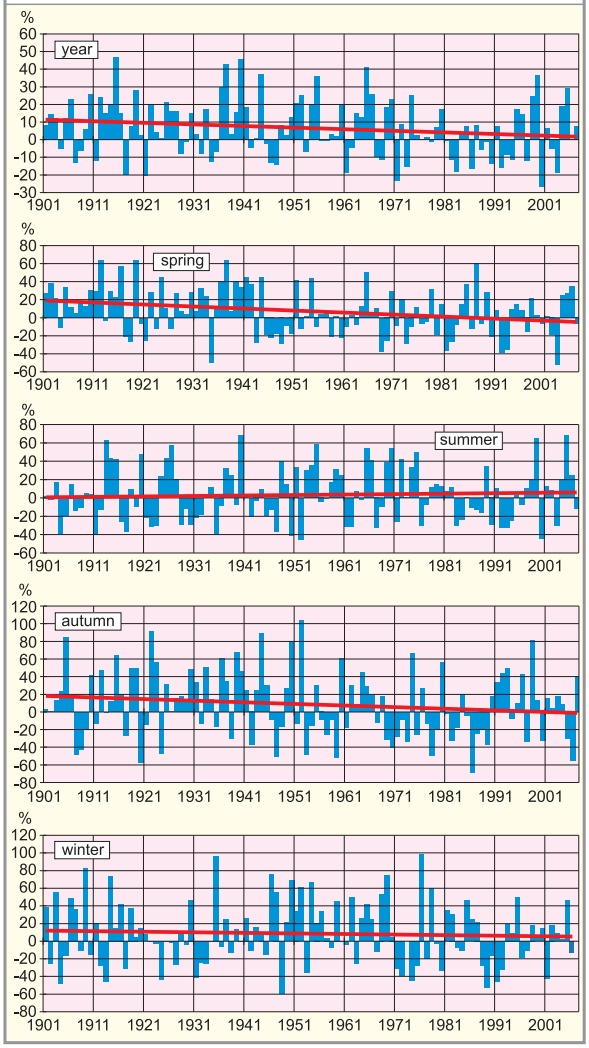
Fig. 31 CHANGE IN ANNUAL MEAN TEMPERATURE (1978–2007)



The temperature trends in Hungary are similar to that expected of global warming. The figures exhibit more noise due to the smaller territory, but they have a similar shape. 2007 was the warmest year since 1901 followed by 2000, 1994 and 2002. The warm years are drier than usual with the exception of 2007, when greater than average precipitation fell. Seasons show the same picture and the warmest seasons have occurred in recent years; spring in 2007, 2000 and 2002; summer in 2003, 2007, 1992, 1994 and 2002; autumn in 2000 and 2006; and winters 2006/2007 and 1997/1998.

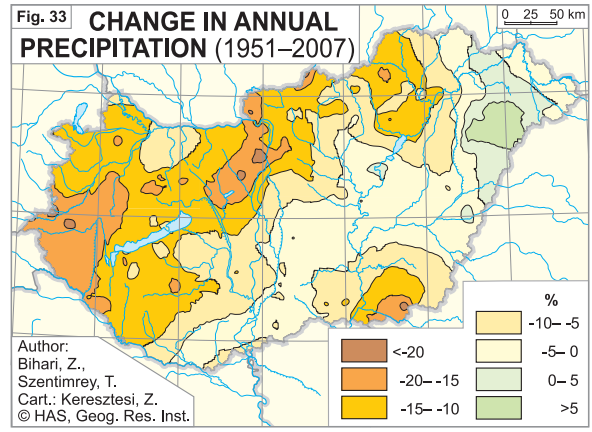
No connection has of yet been detected between the short, late spring and early autumn frosts on the one hand, and the warming tendency on the other. One of the most serious agricultural disasters happened on 2 May 2007, when the minimum temperatures dropped to -6°C in the north-eastern part of the country causing severe frost damage in the apple orchards.

Fig. 32 ANNUAL AND SEASONAL MEAN PRECIPITATION ANOMALIES WITH LINEAR TREND 1901–2007, RELATIVE TO 1971–2000 MEAN



Long-term precipitation shows a decreasing trend (*Figure 32*), but sometimes increasing precipitation is visible as a shorter term tendency (*Figure 33*). No significant change can be observed in summer precipitation and there has been a slight decrease in that for winter (6% since 1901), which runs counter the results of climate projections obtained from dynamic models.

Fig. 33 CHANGE IN ANNUAL PRECIPITATION (1951–2007)



The largest reduction in seasonal precipitation was measured in spring (20% since 1901). Autumn has been affected by a smaller, but quite substantial degree, showing a 17% reduction in precipitation. It is likely that the year-to-year variability has a stronger impact upon the natural environment and humans, than the long-term tendency towards decrease.

In spite of the decreasing annual amount, the precipitation intensity has increased. There has been a growth in the number of days with a higher amount of precipitation. This fact deteriorates the surface water balance, due to the increasing runoff component.

Remarks

Only homogenised data from the Hungarian Meteorological Service (OMSZ) was used for this chapter. The homogenisation procedure was realised by MASH (Multiple Analysis of Series for Homogenisation), the smoothed maps by MISH (Meteorological Interpolation based on Surface Homogenised databases) software. Both were developed by, and are available from the Hungarian Meteorological Service. Maps show the climate norms of the 1971–2000 period. The statistical values are calculated since 1901.

Hydrography

The Danube and its Tributaries

The whole of the Carpathian Basin, including Hungary belongs to the catchment area of the ***Danube*** (817,800 km²). The river extends over 17 countries and has a total length of 2,860 km, of which 410 km lie in Hungary (*Figure 34*). The water regime of the Danube is mainly governed by snowmelt and glacial melting in the Alps, the consequence of which is that low water phases accompany snow accumulation in the winter, whilst high water levels and floods are confined to the late spring and early summer. The minimum and maximum discharges at Budapest are between 600 m^3/sec and 10,500 m^3/sec and the annual fluctuation in the water level can reach 8 metres. Mean discharge (1,000–1,500 m^3/s) occurs most frequently during the critical agricultural growing season, whilst in the eastern part of the Carpathian Basin semi-desert weather conditions may prevail.

The Danube is the longest river of the European Union; from its source in the Black Forest in Germany to the edge of the Carpathian Basin it has an upper stream character with a channel gradient of 45–50 cm/km. After having flown into the basin (and Hungary), its gradient drops abruptly within some kilometres to 30–35 cm/km. As a result, the load transported in the main channel is deposited, forming a typical Pleistocene-Holocene alluvial debris fan with bars and islets. After leaving the alluvial fan (from the confluence with the Rába) the Danube proceeds in a channel with a very low gradient (8–10 cm/km). Subsequently it turns from flowing in a west–east direction, into a north–south direction at the Danube Bend, by which time the isles are already stabilised but the main channel still shows a tendency to form bars.

Arriving in the Carpathian Basin (from Bratislava/Pozsony) the Danube divides into three big branches and forms two large islands (Szigetköz and Žitný ostrov/Csallóköz). Later, it absorbs the waters from the catchments of

Fig. 34

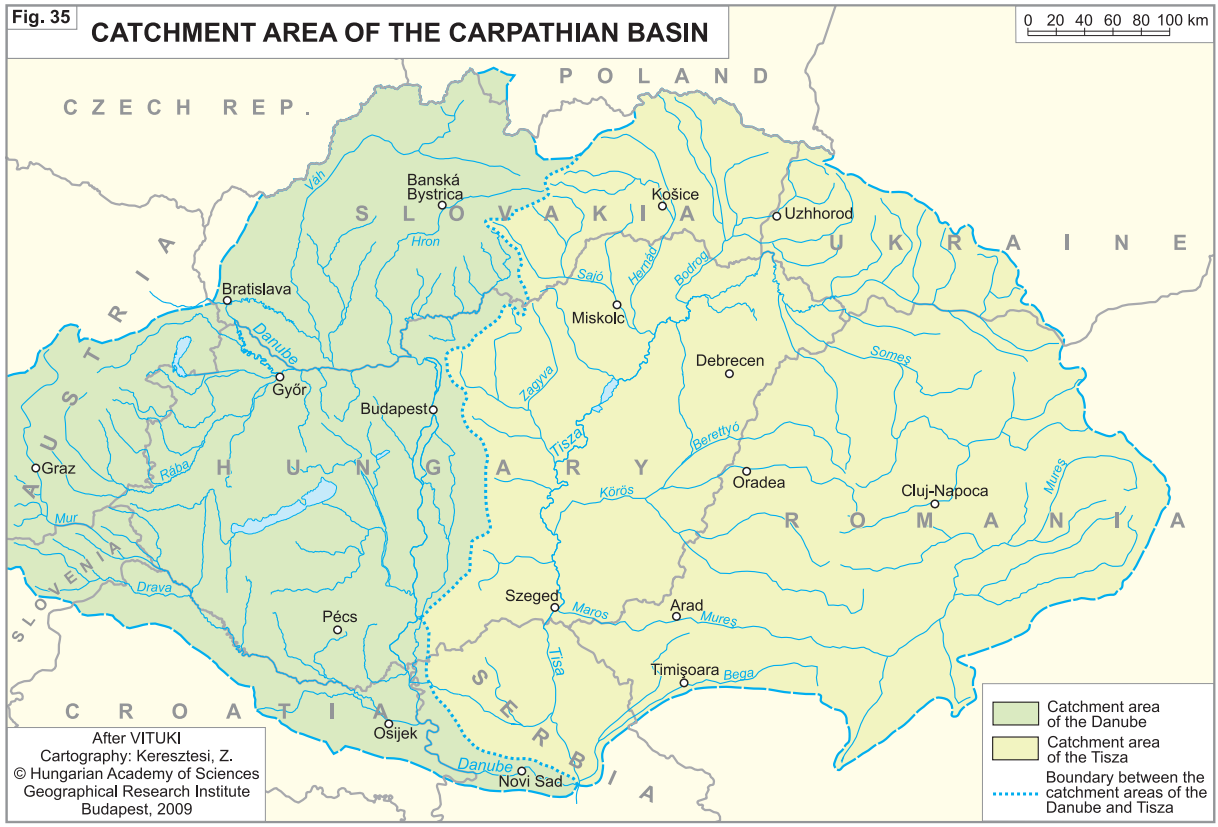
the tributaries: Váh (Vág), Nitra (Nyitra), Hron (Garam), and ***Ipoly*** (Ipeľ), nevertheless they hardly affect the Danube's discharge rates. The ***Rába*** (Raab) river-system carries the waters of the Alpine, north-west Transdanubian region into the Danube.

The ***Dráva*** (Drau), a border river between Hungary and Croatia with a catchment basin of 40,497 km² and a length of 749 km, is the only right-bank tributary of the Danube in Hungary with a significant water discharge.

The Tisza and its Tributaries

The entire watershed of the ***Tisza*** (157,135 km²) – the largest left-bank tributary of the Danube – is to be found within the Carpathian Basin (*Figure 35*). The Tisza rises from the Marmarosh Mountains (Ukrainian Carpathians) and flows after 1,260 km into the Danube at Titel (Serbia). From the point where the main branch of the Tisza reaches the Alföld (Great Hungarian Plain) 5–6 cm/km maximum gradients prevail, and along the lower stretches of the river they are reduced to 2–3 cm/km. Therefore, the river meanders lazily, forming sinuous loops, fens and oxbow lakes. The Tisza often changed course prior to its regulation, and frequent floods used to inundate 1,963,770 ha of the Alföld. As a result of the regulation and control measures (1846–1880) the length of the river between Tiszabecs and Titel decreased from 1419 to 966 km, forming 589 km of 'dead arms', oxbow lakes and newly cut riverbeds of 136 km.

The Tisza floods with a frequency of 57.9% and experiences two peaks of high stages: one in early spring and another in early summer. Floods last for 5–20 days in the upper reaches, whereas in the Lower Tisza valley the travel time can be 20–200 days. The river has a highly fluctuating water regime where the difference between the low and high water discharge, e.g.



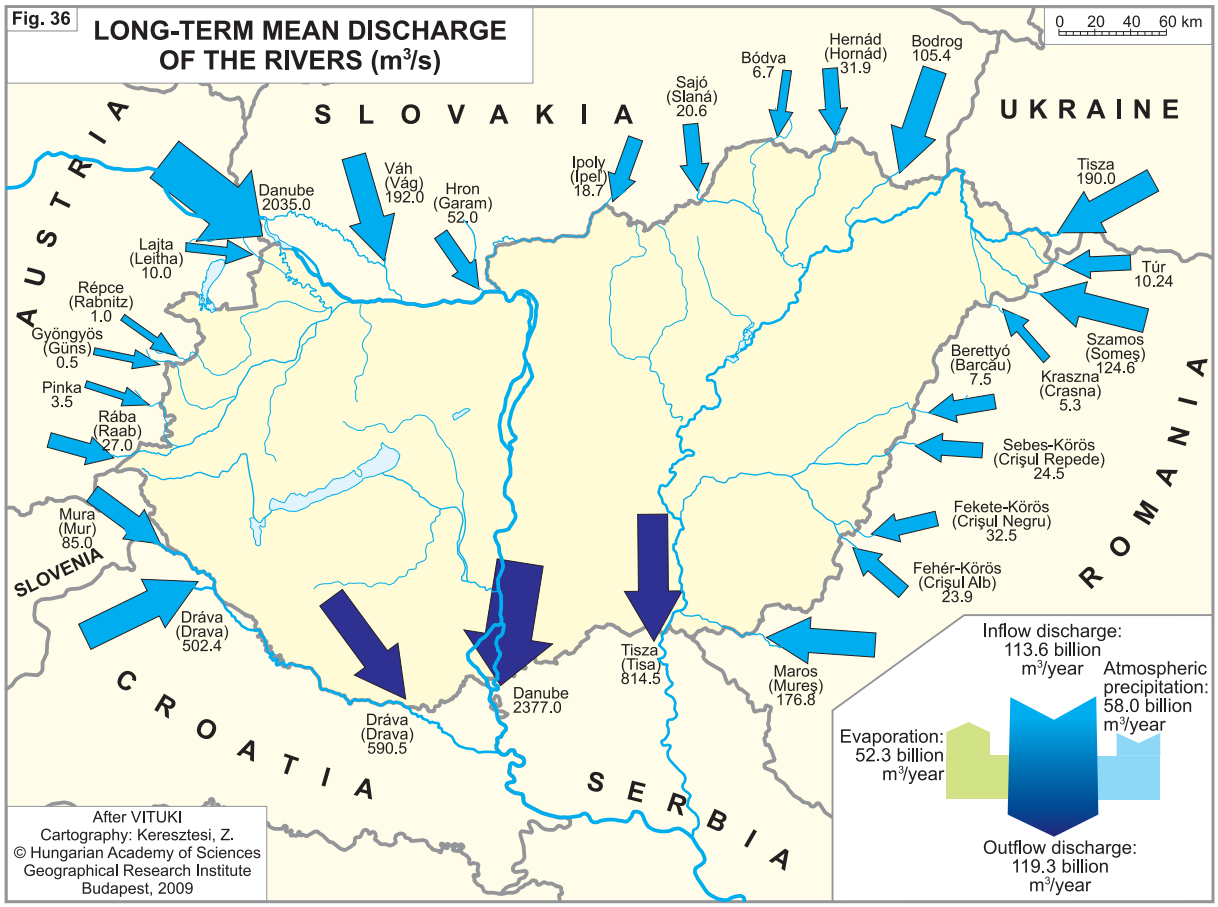
at Szolnok, could be 63-fold (60 and 3,800 m^3/sec, respectively).

This phenomenon is due to the major tributaries of the river. On the right-bank in Hungary, the ***Bodrog*** formed by the confluence of five rivers joins the Tisza at Tokaj. Arriving from the Slovakian Ore Mountains, the ***Sajó*** (Slaná) collects the waters of the rivers ***Bódva*** and ***Hernád*** (Hornád) before its confluence with the Tisza. Downstream the other right-bank tributaries are of little importance as sources of water supply. On the left bank at Vásárosnamény, the rivers ***Szamos*** (Someş) and ***Kraszna*** (Crasna) join the Tisza, which drain the northern part of the Transylvanian Basin. The ***Körösök*** mainly collects the waters of the Fehér-Körös (Crişul Alb), Fekete-Körös (Crişul Negru), Sebes-Körös (Crişul Repede) and Berettyó (Barcău) from a total catchment area of 27,537 km^2. The Tisza's largest tributary is the ***Maros*** (Mureş) at 761 km, which drains waters mainly from South Transylvania and reaches the Tisza near Szeged following a short section in Hungary.

Flood Control, River Regulation and Water Management

Following the Ottoman occupation, during the 18th century a reactivation of the drainage network started, together with the instigation of water regulation measures and development of the flood control system. Peace treaties following the two world wars drew the Hungarian state borders along the rim of the basin and most of the Danube's catchment area became subdivided between the successor states of the Austro-Hungarian Monarchy. As a result most

Fig. 36



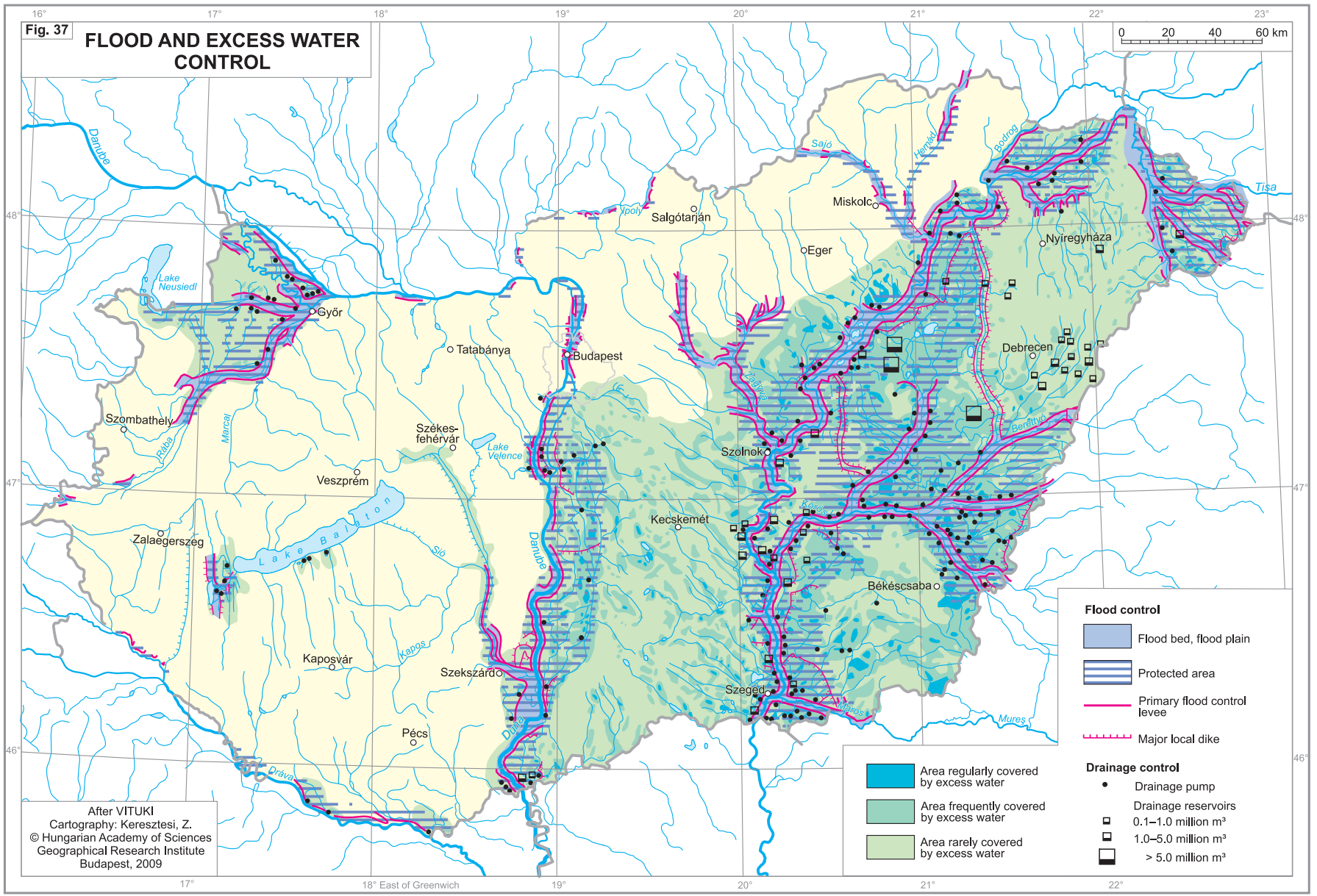


Fig. 37
FLOOD AND EXCESS WATER CONTROL
0 20 40 60 km
Danube
Lake Neusiedl
Győr
Tatabánya
Budapest
Ipoly
Salgótarján
Sajó
Hernád
Bodrog
Tisza
Miskolc
Eger
Nyíregyháza
Debrecen
Szombathely
Rába
Marcal
Székes-fehérvár
Lake Velence
Veszprém
Zagyva
Berettyó
Szolnok
Körös
Kecskemét
Zalaegerszeg
Lake Balaton
Sió
Danube
Békéscsaba
Kaposvár
Kapos
Szekszárd
Szeged
Maros
Mureş
Pécs
Dráva
Danube
Flood control
Flood bed, flood plain
Protected area
Primary flood control levee
Major local dike
Drainage control
Drainage pump
Drainage reservoirs
0.1–1.0 million m³
1.0–5.0 million m³
> 5.0 million m³
Area regularly covered by excess water
Area frequently covered by excess water
Area rarely covered by excess water
After VITUKI
Cartography: Keresztesi, Z.
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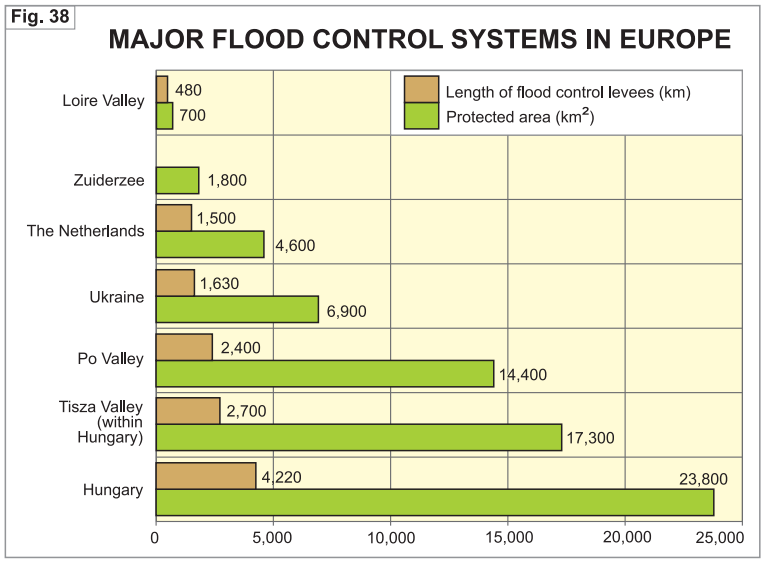
Budapest, 2009
16° 17° 18° 19° 20° 21° 22° 23°
48° 47° 46°
18° East of Greenwich

of the active drainage area came to be located beyond the national borders, to such an extent that at present virtually no runoff is formed on the territory of Hungary.

The whole drainage network of contemporary Hungary is incorporated into that of the Carpathian Basin. 95% of the long-term discharge of the largest rivers leaving the country across the southern border, arrives from abroad, merely flowing through the country, and barely 5% is formed on its territory. Although the Tisza catchment represents ca half of the country's territory, the river provides for a mere 20–25% of the total discharge leaving Hungary, whereas 75–80% is transported by the Danube and Drava rivers (*Figure 36*).

14 Hungarian rivers that are critical for water management have their catchment area providing abundant runoff outside of the country, and only 4 minor watercourses rise within the territory and do not leave its borders. Rivers entering Hungary have high channel slope gradients, which serves as a source of considerable flood hazard. Flood plains extend over 23,800 km^2 protected by levees of 4,220 km in length (*Figure 37*). The regime of rivers flowing into the plains shows extreme values. The upper reaches of tributaries are particularly wild; especially dangerous are those of the Upper Tisza and of the Körösök (the latter empties into the Lower Tisza) where the water level might rise 8–10 m within 20–30 hours following intense rainfall. Hungary occupies a prominent position in European comparison with regards to the extension of its land protected from floods, and connected flood control structures (*Figure 38*).

Fig. 38



To mitigate the extreme flood hazard, drainage regulation measures and the construction of flood control embankments started nearly 200 years ago and their alteration – amongst others, the establishment of detention reservoirs – has been continuous ever since. With the regulation of the Danube, its Hungarian section has shortened by nearly 100 km. The length of the Tisza channel on the present-day territory of Hungary has been reduced from 1,213 km to 759 km. All these have resulted in increasing flood subsidence (especially on the Upper Tisza), however, it may also result in grave situations developing on the Lower Tisza, dependent on the coincidence of, or difference between high water stages of the tributaries. Hungary is among the countries in Europe most severely endangered by floods.

A frequent occurrence is that high stages on the tributaries of the Tisza delay or dam up the flood waves, thus lengthening their travel time and raising the height of the flood level. In extraordinary cases, a simultaneous high water stage on the Danube might dam water in the Tisza channel up to the confluence of the Maros and, though very rarely, up to that of the Körösök.

In order to drain waterlogged areas and those with excess water in springtime, drainage canals were built in the terrain beyond the protected areas, with a length of 42,493 km, primarily in the Tisza catchment area.

Water management difficulties are numerous, such as those stemming from a hydrographic network that is divided between two catchments; the task of draining floods on the Tisza; and difficulties caused by a deficit of moisture over wide areas during the growing season. Difficulties are potentially further aggravated by disastrous water pollution events. All the subsurface waters of the Eastern Alps and Carpathian Basin flow through the country, floods (and pollution) travel on its major rivers, but low stages also occur during arid periods.

To reduce the impact of extremities and other problems, barrages were constructed in the Tisza catchment at Tiszalök (1954) and Kisköre (1973). The former di-

rects water to a 108 km long channel, the East Main Canal (carrying 80 m^3/s) to the lands situated north of the Körösök river suffering from frequent summer droughts, and provides water for the irrigation of 130,000 ha. The barrage at Kisköre has created the largest flatland reservoir in the Carpathian Basin with a surface area of 127 km^2. Besides ensuring the irrigation of 350,000 ha in the Middle Tisza, the Kisköre reservoir (also known as ***'Lake Tisza'***) has become one of the country's most popular holiday destinations as a result of the attractive natural environment and the development of tourism infrastructure.

Lakes

Lake Balaton is the largest shallow water lake in Central Europe, and a most important tourist destination of the country, second only to Budapest. Since 1918 when Hungary became landlocked, it has often been referred to as the 'Hungarian Sea'. The 76.5 km long lake with an average depth of 3.3 metres has a total surface area of 588.5 km^2, of which only 17 km^2 is covered by reeds. The basin of the Balaton is divided into two parts by the Tihany Peninsula. Evaporation from the water surface (900–950 mm/year) exceeds annual precipitation. The primary water supplier is the Zala river, with a catchment of 2,627 km^2. The water level is regulated by the only outflow, the Sió. The entire surroundings of the lake are canalised and refuse water is drained off the catchment area. Due to the shallow nature of the lake, the average water temperature during summer is 25°C, which makes the beaches of Lake Balaton especially attractive. The reflection of strong sunshine from the water body functions as secondary radiation, affecting the microclimate of the Balaton region favourably, from which the orchards and vineyards of the south-facing slopes benefit considerably.

The shallow ***Lake Fertő*** (Neusiedler See) lying in the Austrian-Hungarian borderland is the second largest lake in the Carpathian Basin with an area of 309 km^2, nearly a quarter of which belongs to Hungary. The fluctuation in the water level is caused mostly by climatic conditions; as a result the lake bed has dried up on several occasions in the past. 180 km^2 out of the lake surface is covered by reeds, primarily in the Hungarian parts.

The third largest area of still water in Hungary is ***Lake Velence.*** Because of its shallowness and the sunny climate it is one of the warmest lakes in Europe (with summer temperatures of 26–28°C). One third of the small (26.5 km^2) area of the 1.1–2.2 m deep lake is covered by reeds. Two reservoirs were constructed in the catchment area to regulate its water level. Due to its close location to Budapest and the motorway, it is a popular tourist destination.

Soils

Soil Formation

Soil is the uppermost part of the weathered surface layer of Earth, developed within the interaction zone of the lithosphere, atmosphere, hydrosphere and biosphere under the integrated influence of soil forming factors. Soil is a three-phase, four-dimensional, polydisperse system; a conditionally renewable, multifunctional natural resource with two characteristic features: fertility and resilience**.** The main soil formation processes are the accumulation of organic matter and structure formation, whilst the main processes taking place inside the soil are the heat, water and organic matter regimes, and the biogeochemical cycles of elements, including both plant nutrients and pollutants.

Soils of Hungary

Hungary is situated in the deepest part of the hydrogeologically closed Carpathian Basin, where the majority of the parent material is of relatively young geological formation; Quaternary loess or Holocene and recent aeolian sands, alluvial or colluvial sediments or re-deposited loess.

The climate includes Atlantic, Continental and Mediterranean elements. The water balance of the Alföld is negative (the deficit being mitigated by surface runoff, seepage or groundwater flow from the more humid mountainous regions).

Drainage conditions are poor; consequently the accumulation processes prevail in soil formation. Human activities (such as deforestation, grazing, water regulation, intensive farming, and urbanisation) have had both significantly effects on the soil formation and soil degradation processes.

Hungarian soil cover is highly heterogeneous. Almost each phase of the following soil sequences can be distinguished:

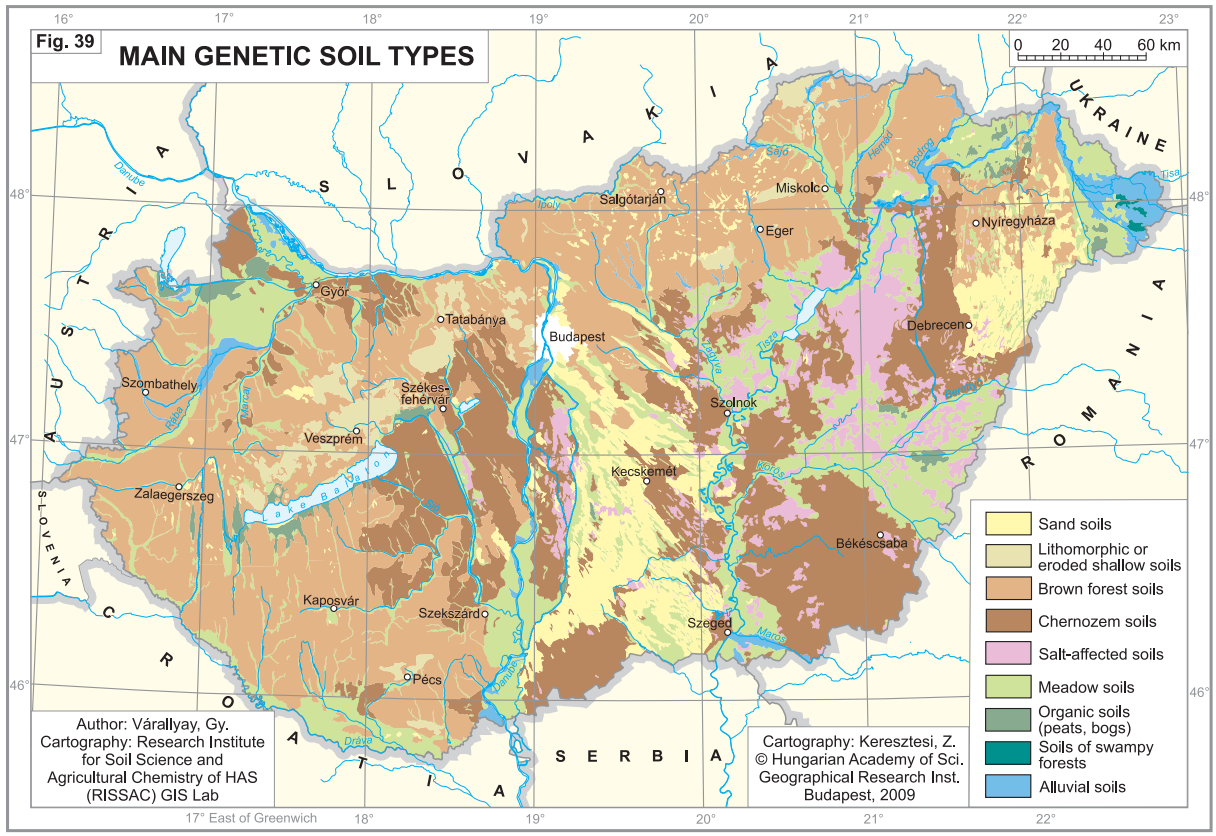
- chronosequence;
- topo-sequence (catena);
- leaching sequence;
- salinity/alkalinity sequence;
- erosion sequence.

As a generalised summary one can find the following types of soils in the country (*Figure 39*):

- shallow soils eroded to differing degrees, eroded soils on steep hills;
- various brown forest soils in humid hilly regions;
- humous sandy soils and chernozems on sand and loess plateaus of relatively higher elevation with a marked aridity and deep water table;
- various hydromorphic soils, i.e. meadow soils and salt-affected soils at lower altitudes;
- organic soils in areas that are either permanently or periodically waterlogged.

Land Degradation and Soil Fertility

Land, i. e. soil, water and near-surface atmosphere continuum, with its geology, relief and biota represents a key natural resource of Hungary. The most important functions related to soil are that it is:



– a conditionally renewable natural resource;

– a reactor, transformer and integrator of the combined influences of other natural factors; a host for interaction between the spheres;

– a medium for biomass production and a primary source of food for the biosphere;

– used for the storage of heat, water and plant nutrients;

– a high capacity buffer medium;

– a natural filter and detoxication system;

– a significant gene reservoir; and

– the preserver and carrier of the heritage of natural and human history.

The natural conditions (climate, water, soil and biological resources) of the Carpathian Basin (particularly in the lowlands and plains) are generally favourable for rainfed biomass production (*Figure 40*). However, these conditions show extremely high and irregular (consequently barely predictable) spatial and temporal variability; they are often extreme and sensitive to various natural or human-induced stresses. The generally favourable agro-ecological potential is predominantly limited by three soil factors:

(1) Soil degradation processes;

(2) Extreme moisture regime;

(3) Unfavourable changes in the biogeochemical cycles of elements, in particular those of plant nutrients and environmental pollutants.

In Hungary the most important soil degradation processes are as follows:

– soil erosion by water or wind;

– soil acidification;

– salinisation/alkalisation/sodification;

– physical soil degradation, such as structure destruction, compaction or surface sealing;

– extreme moisture regime: simultaneous hazard of over-moistening, waterlogging and drought-sensitivity;

– biological degradation, such as unfavourable changes in soil biota or decrease in soil organic matter;

– unfavourable changes in the biogeochemical cycles of elements, especially in the regime of plant nutrients; and

– decrease in the buffering capacity of soil, soil pollution, and environmental toxicity. The main regions affected by soil degradation are indicated in *Figure 41*.

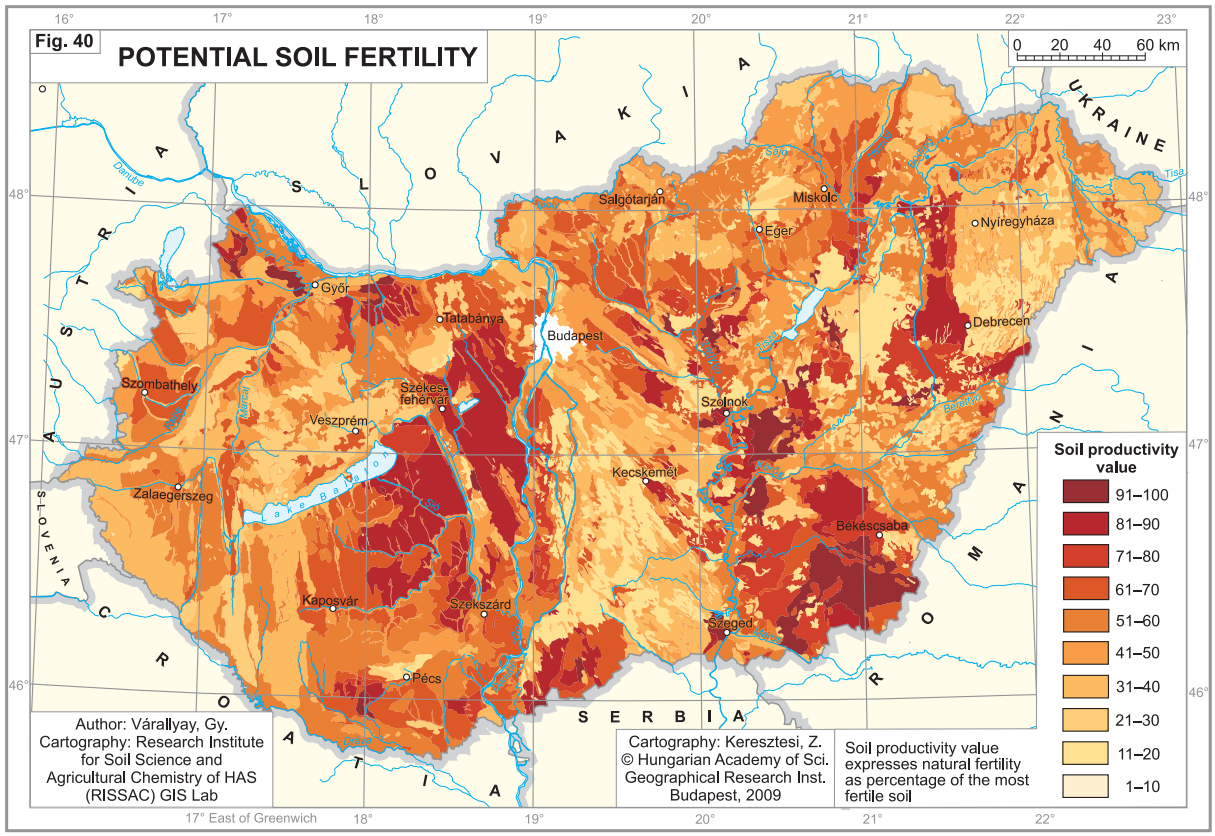


Fig. 40
POTENTIAL SOIL FERTILITY
0 20 40 60 km
Soil productivity value
91–100
81–90
71–80
61–70
51–60
41–50
31–40
21–30
11–20
1–10
Soil productivity value expresses natural fertility as percentage of the most fertile soil
Author: Várallyay, Gy.
Cartography: Research Institute for Soil Science and Agricultural Chemistry of HAS (RISSAC) GIS Lab
Cartography: Keresztesi, Z.
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Salgótarján
Miskolc
Eger
Nyíregyháza
Debrecen
Győr
Tatabánya
Budapest
Szombathely
Székesfehérvár
Veszprém
Szolnok
Kecskemét
Zalaegerszeg
Békéscsaba
Kaposvár
Szekszárd
Szeged
Pécs
17° East of Greenwich

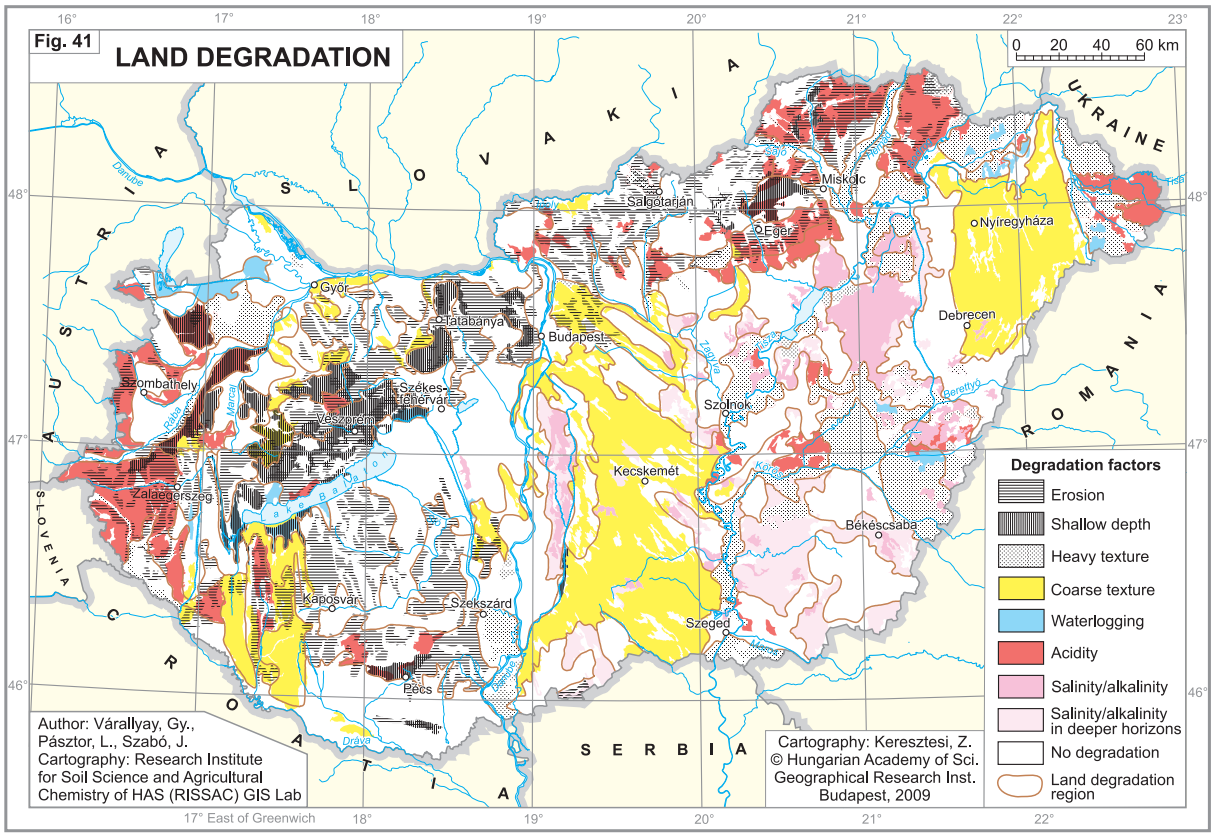
Fig. 41
LAND DEGRADATION
0 20 40 60 km
Degradation factors
Erosion
Shallow depth
Heavy texture
Coarse texture
Waterlogging
Acidity
Salinity/alkalinity
Salinity/alkalinity in deeper horizons
No degradation
Land degradation region
Author: Várallyay, Gy., Pásztor, L., Szabó, J.
Cartography: Research Institute for Soil Science and Agricultural Chemistry of HAS (RISSAC) GIS Lab
Cartography: Keresztesi, Z.
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Salgótarján
Miskolc
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Budapest
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Szolnok
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Zalaegerszeg
Békéscsaba
Kaposvár
Szekszárd
Szeged
Pécs
17° East of Greenwich

Hydrophysical Properties of Soils

Water resources are limited in Hungary where atmospheric precipitation shows high, irregular and sometimes extreme spatial and temporal distribution. Most surface waters rise from beyond the national borders, whilst a considerable portion of the limited amount of subsurface waters is of poor quality (exhibiting high salinity and/or sodicity).

For the exact identification of the hydrophysical properties and moisture regime of soils a comprehensive system of soil survey and analysis, categorisation, mapping, modelling and prognosis was developed in Hungary, which includes five basic elements:

– general identification of the hydrophysical properties of soils;

– establishment of a category system and mapping of hydrophysical properties and soil moisture constants at a scale of 1:100,000 (*Figure 42*);

– identification of moisture regime types and their mapping at a scale of 1:100,000 (*Figure 43*);

– elaboration of a methodology for large-scale (1:10,000–1:25,000) mapping of hydrophysical characteristics;

– building up models for quantitative monitoring of the soil moisture regime.

Soil is the largest potential natural water reservoir in Hungary. The soil layer down to a depth of 100 cm is capable to store more water than half of the average annual precipitation and about half of this can be termed as the "available" moisture content. In spite of this fact, Hungary is to be characterised by its extreme

Fig. 42 SOIL WATER MANAGEMENT

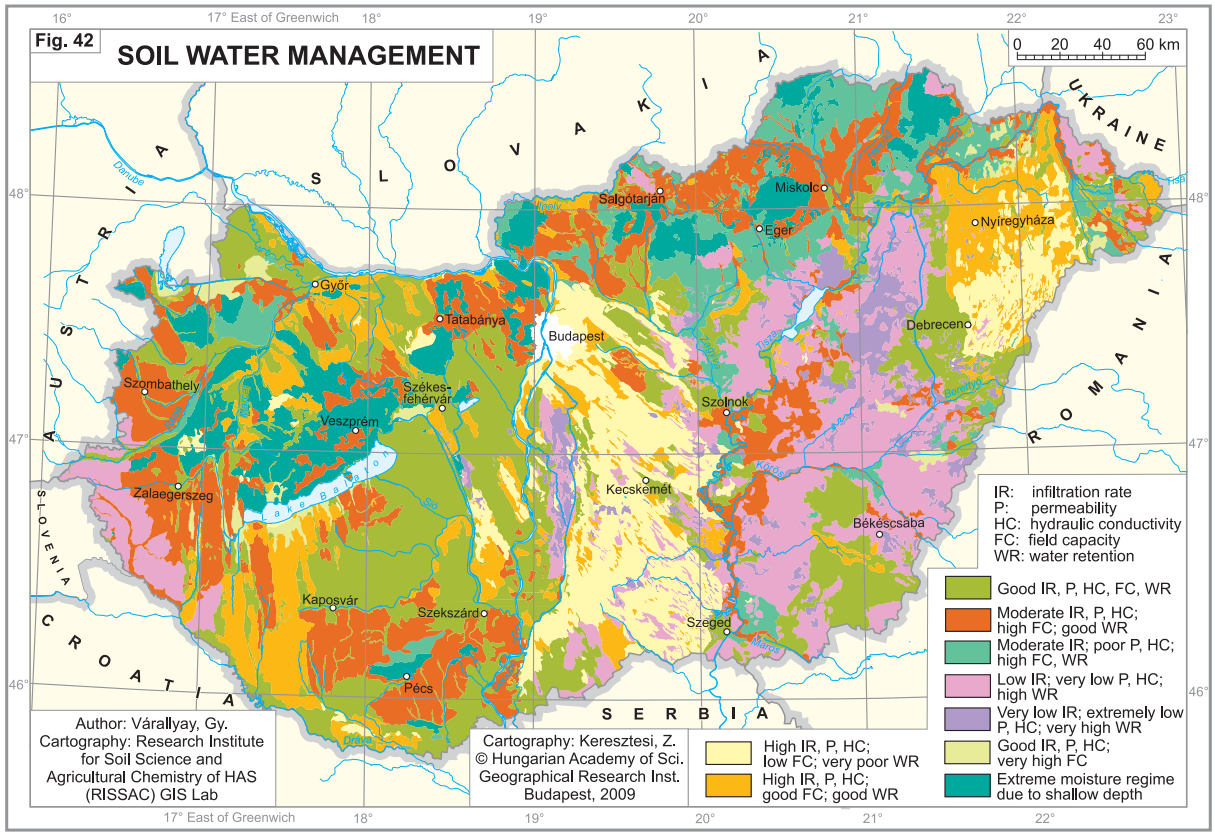
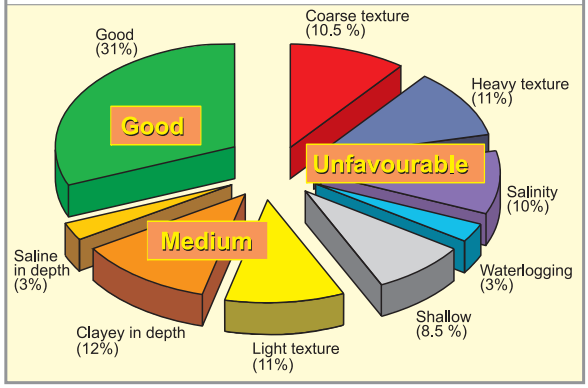


Fig. 43 GENERAL SOIL MOISTURE REGIME



moisture regime. Severe hydrological events occur with a high (and increasing) frequency, intensity, and duration (such as flooding, waterlogging, over-moistening or drought), sometimes within the same year and even in the same location. The cause of this apparent contradiction is that only a small portion of the potential water storage capacity of soils can be used, for the following reasons:

– soil pores are not empty;
– infiltration of water is prevented by frozen topsoil;
– seepage is hindered or reduced by a nearly impermeable layer;
– water retention of soil is poor and a considerable proportion of the infiltrated water is lost to deep filtration.

Traditional and Digital Soil Mapping in Hungary

A large amount of soil information is available in Hungary as a result of long-term observations, various soil surveys, analyses and mapping activities (www.mta-taki.hu). The collected data are accessible in various dimensions: at national, regional, micro-regional scales, at a farm and field level, and generally presented in maps, serving different purposes as to spatial and/or thematic aspects (*Figure 44*).

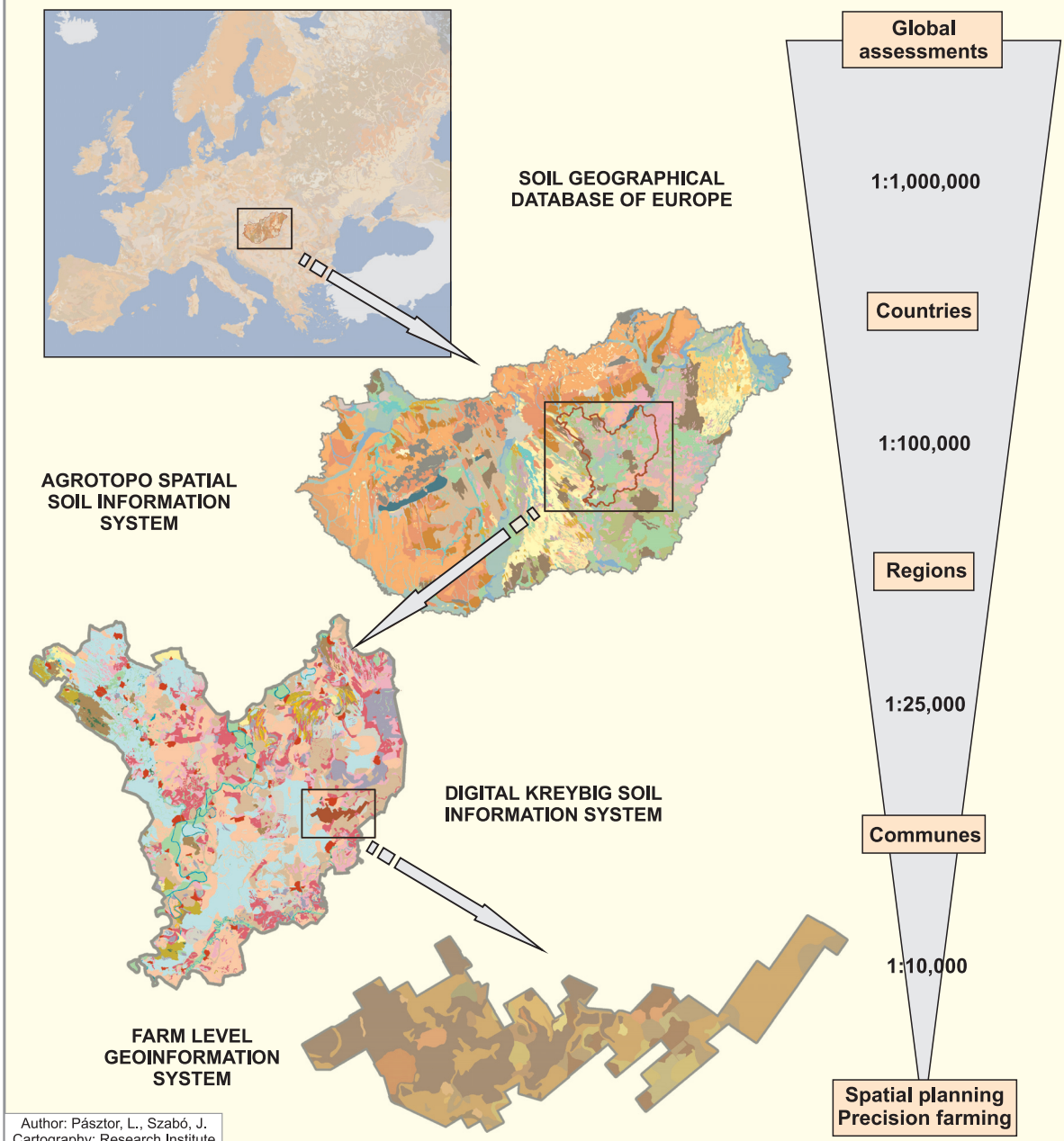
Since the late 1980s, a gradually increasing proportion of soil related data has been digitally processed and organised into various spatial soil information systems. Initially small-scale digital soil maps were compiled. The first national spatial soil information system was known as AGROTOPO, which is virtually the GIS adaptation of the output from the "Assessment of the agro-ecological potential of Hungary" programme, in the form of maps at 1:100,000 scale. AGROTOPO provides a suitable data source on both national and regional levels.

Clearly, various fields of activity (be it environmental protection, land evaluation, precision farming, etc.) need to rely on digital spatial soil information at larger scales. To meet this requirement, GIS processing of the large-scale, practice-oriented soil maps represent a challenging task in Hungary. GIS adaptation and digital reambulation of the 1:25,000 scale, applied soil mapping programme – hallmarked by L. Kreybig – is of prime importance and currently under way to eventually result in the Digital Kreybig Soil Information System which will be available for solving problems on a sub-regional scale.

Digital reambulation and GIS adaptation of the 1:10,000-scale Genetic Soil Mapping and National Land Evaluation Programme are also receiving increased attention. Several pilot projects have been carried out for the compilation of integrated geo-information systems for various agricultural farming units.

Fig. 44

TRADITIONAL AND SPATIAL SOIL INFORMATION SYSTEMS



Author: Pásztor, L., Szabó, J.
Cartography: Research Institute for Soil Science and Agricultural Chemistry of HAS (RISSAC) GIS Lab

Flora

The evolution of the flora and vegetation started at the end of the late glacial period, about 12,000 years BP (Before Present). The mountains became covered by sparse pine and birch woodlands and the lowlands by tundra-like Artemisia steppes with scattered groves of pine and birch. From 10,000 years BP in the Preboreal phase – or 'pine-birch age' – the climate had improved somewhat. Closed pine forests developed, the first broad-leaved trees (oak, lime and maple) appeared in the mountains, and alder, birch and elm grew on the lowland.

By 9,000 years BP the climate had turned notably warmer and drier, marking the start of the Boreal phase, or 'hazelnut age'. The pine forests almost completely disappeared and in the mountains mixed-forests became dominant, composed of oak, elm and lime, whilst in the lowlands forested areas were dramatically shrinking in size and large grassland areas developed with a prevalence of drought-tolerant grasses on the loess plateaus, and forest-steppe mosaics did on the sandy terrain. Hazelnut played a less decisive role than elsewhere in the plains of Central Europe. This was also the main period of immigration for the continental elements of the Pannonian flora, with the opening of the waste shifting sand areas and the appearance of Pannonian endemics that settled on them.

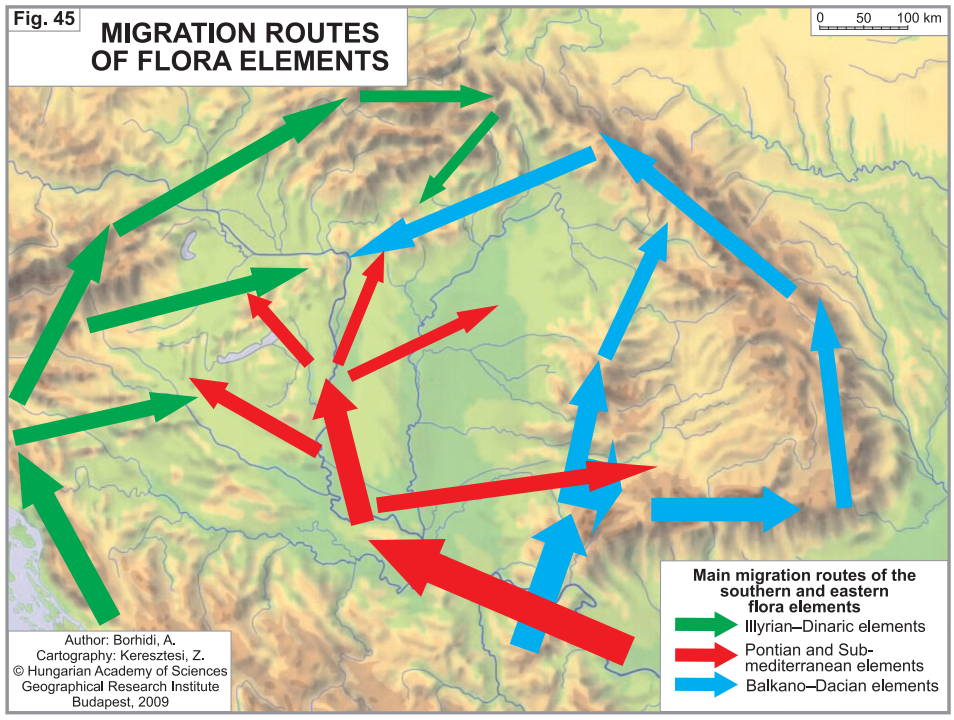
The postglacial (Holocene) climate optimum was warm and wet, lasting between 8,000 and 5,000 years BP. This was the Atlantic phase or 'oak-age', when the annual mean temperature was 3°C higher than today. Oak forests dominated, beech and hornbeam stands grew in the mountains, and evergreens appeared in the shrub and herb layers. Beech prevailed even on the Balaton Upland. This was also the main period for the immigration of Submediterranean, Ponto-Mediterranean and Atlanto-Mediterranean elements. In the Hungarian plains the steppes withdrew; they were replaced by the zonal forest-steppe mosaic as the ruling vegetation type, and by the thermophilous water vegetation in the waste alluvial areas of the big river valleys.

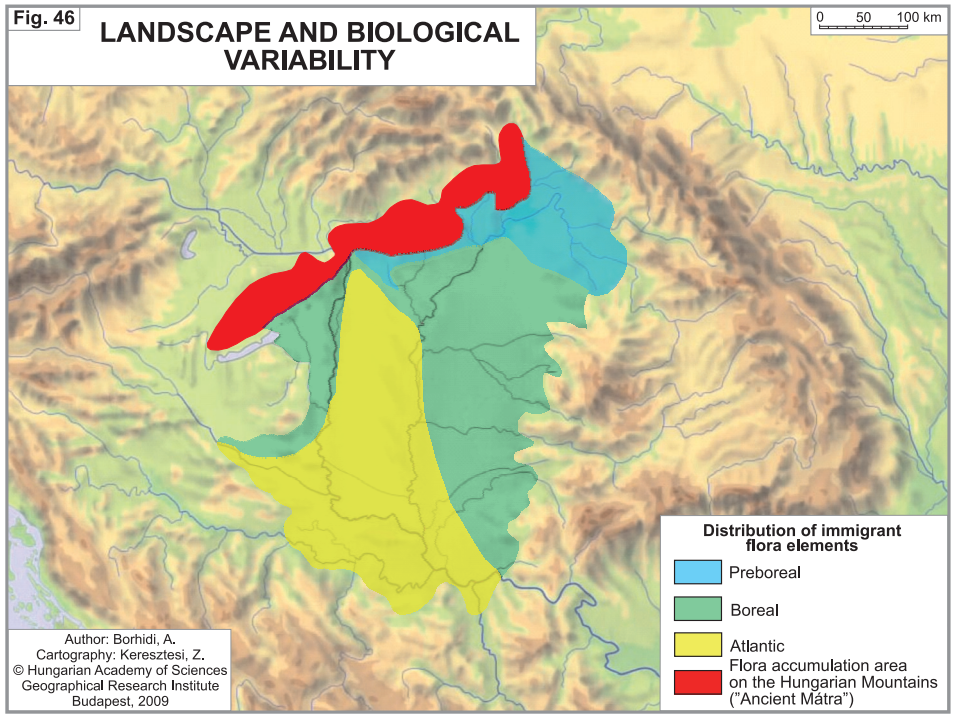
Around 5,000 years BP the climate again started to cool down and the Subboreal phase or 'beech 1 period' set in . However, it remained wet, which was advantageous for the expansion of the beech and oak-hornbeam forests, even facilitating their descent onto the plains. The climate was also favourable for a massive expansion of swamps and bogs. It was in this period that human impact started to transform the landscape which has eventually resulted in a definitely cultural landscape. This process has amplified over the last 2,500 years, during the Subatlantic phase or 'beech 2 period' until the present day.

Distribution Types and Migration of the Flora

Hungarian flora includes 2,600 species of higher plants, grouped into the following distribution types: Endemics (3.4%), Balkanian (4%), Alpine (2.7%), Boreal (0.5%), Eastern-continental (13.2%), Submediterranean (12.2%), Subatlantic (2.3%), European (14.4%), Eurasian (22.1%), Circumboreal (6.8%), Cosmopolitan (5.6%) and Aliens (12.6%). Old endemics, e.g. *Linum dolomiticum, Ferula sadleriana,* and *Onosma tornense*, are sporadically encountered in the mountains, while the younger types are endemics in the Alföld (Great Hungarian Plain), e.g. *Colchicum hungaricum, Dianthus diutinus* and *Crataegus nigra*. These are confined to the sandy and alluvial areas of the Danube–Tisza Interfluve, reshaping pioneering habitats by the postglacial river dynamics of the Danube controlled by a similar process acting also actually in the Amazonas Basin.

During the postglacial age, about 4,500 species changed their areas of distribution. The postglacial immigration of flora took place in





two major phases: 1. The 'Flora-jam phase', i.e. the accumulation of flora migrating northwards from the lowlands to the Hungarian Mountains and the southern foothills of the Carpathians, starting from the late Glacial to the end of the Atlantic (12,000 to 5,000 BP); 2. Descent of the montane elements from the hills to the alluvial lowland belts, starting from the Subboreal, as well as the spread of the steppe elements over the open lowland areas, encouraged by increasing human activity. The three main migratory routes of the southern and eastern elements are seen in *Figure 45*. The distribution of elements from outside the territory, and their accumulation, is illustrated in *Figure 46*. The Oriental and Pontian elements of current Pannonian flora do not originate from the Ukrainian–Russian steppes, rather they herald from the western shores of the Black Sea, from whence they migrated along the Danube Valley. Their immigration is the result of a simultaneous process with the evolution of the East European one (see the area of *Alyssum tortuosum*, in *Figure 47*). As a result of these flora migrations, the plains and hills of the Carpathian Basin form the autonomous Pannonian flora province, divided into 5 sectors: Eupannonicum (Alföld, comprising 7 districts); Matricum (North Hungarian Mountains with 5 districts); Bakonyicum (Transdanubian Mountains with 4 districts); Praenoricum (West Hungarian Borderland with 5 districts); and Praeillyricum (South-West Hungary with 4 districts) *(Figure 48).*

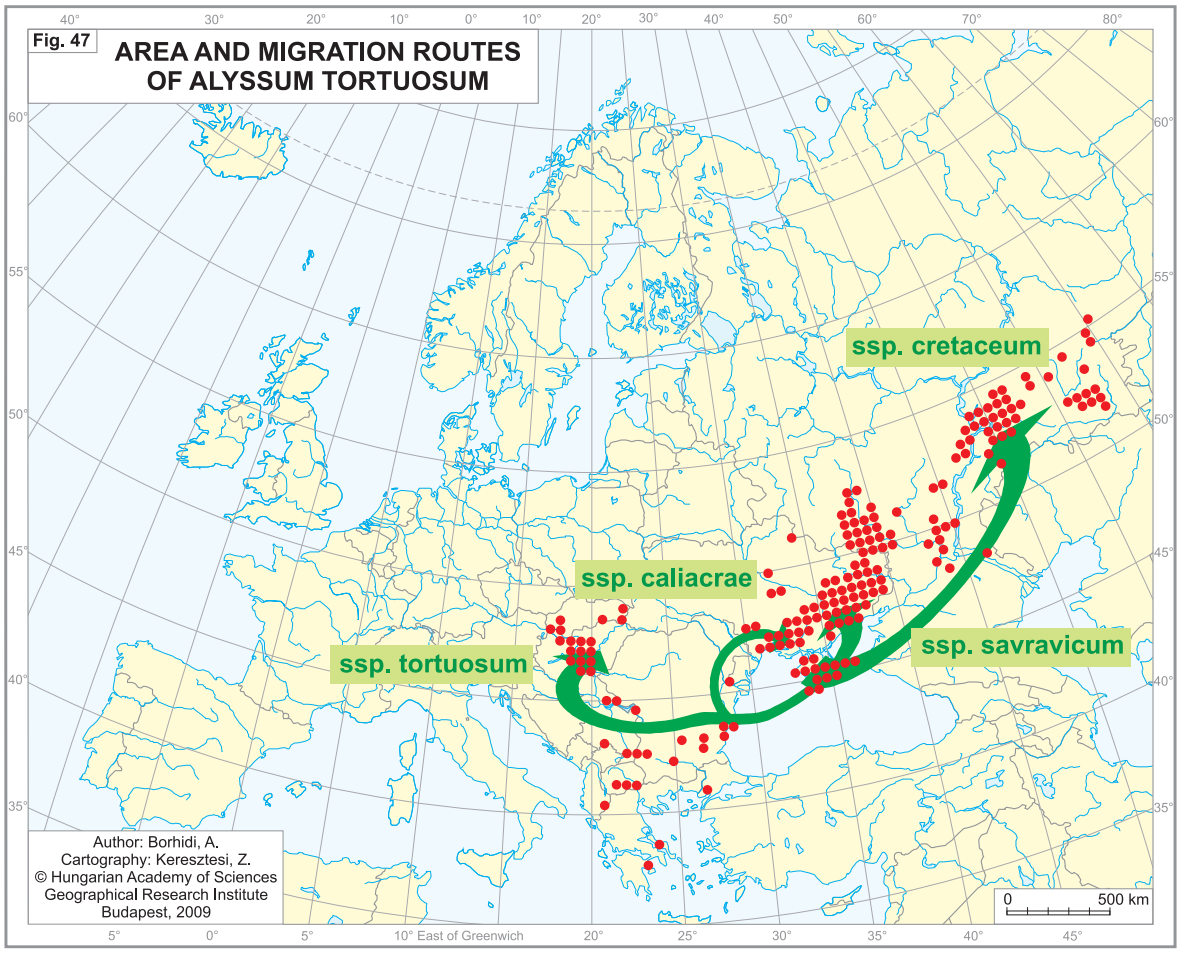


Fig. 47
AREA AND MIGRATION ROUTES OF ALYSSUM TORTUOSUM
ssp. cretaceum
ssp. caliacrae
ssp. savravicum
ssp. tortuosum
Author: Borhidi, A.
Cartography: Keresztesi, Z.
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Geographical Research Institute
Budapest, 2009
0 500 km

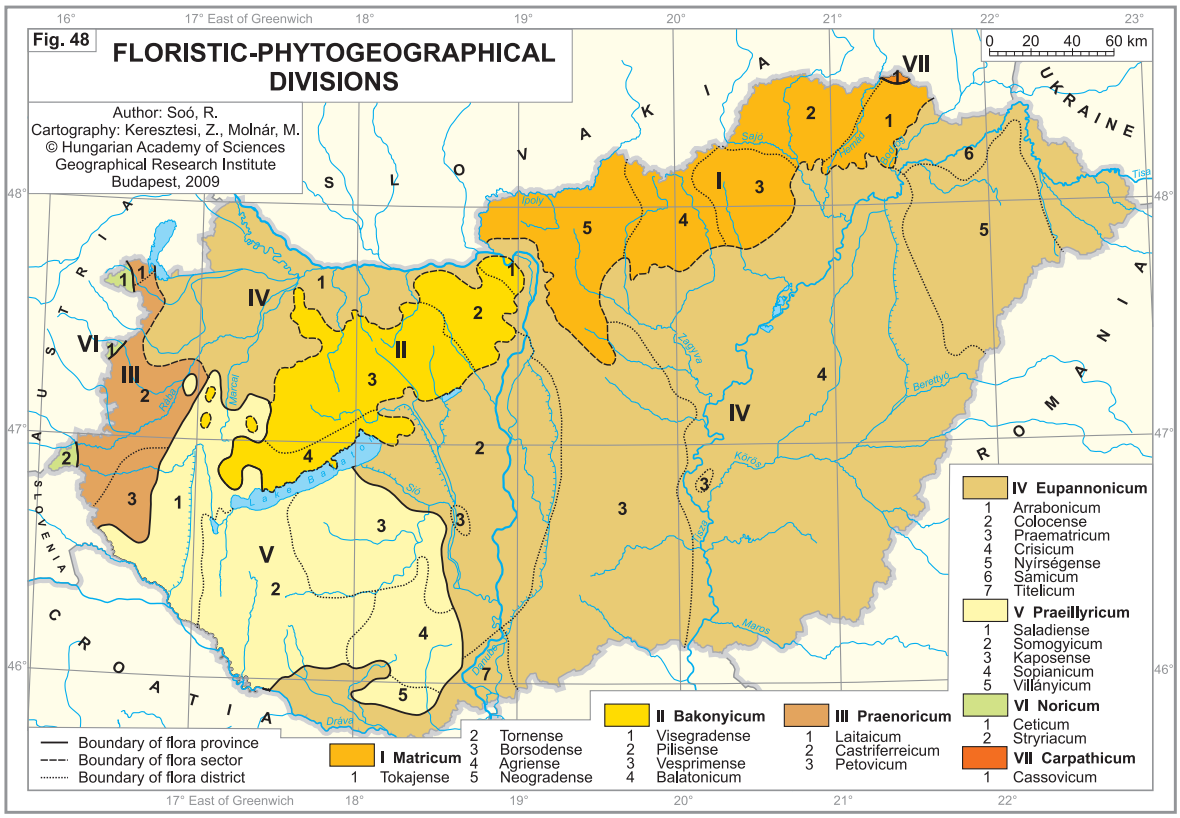
Fig. 48
FLORISTIC-PHYTOGEOGRAPHICAL DIVISIONS
Author: Soó, R.
Cartography: Keresztesi, Z., Molnár, M.
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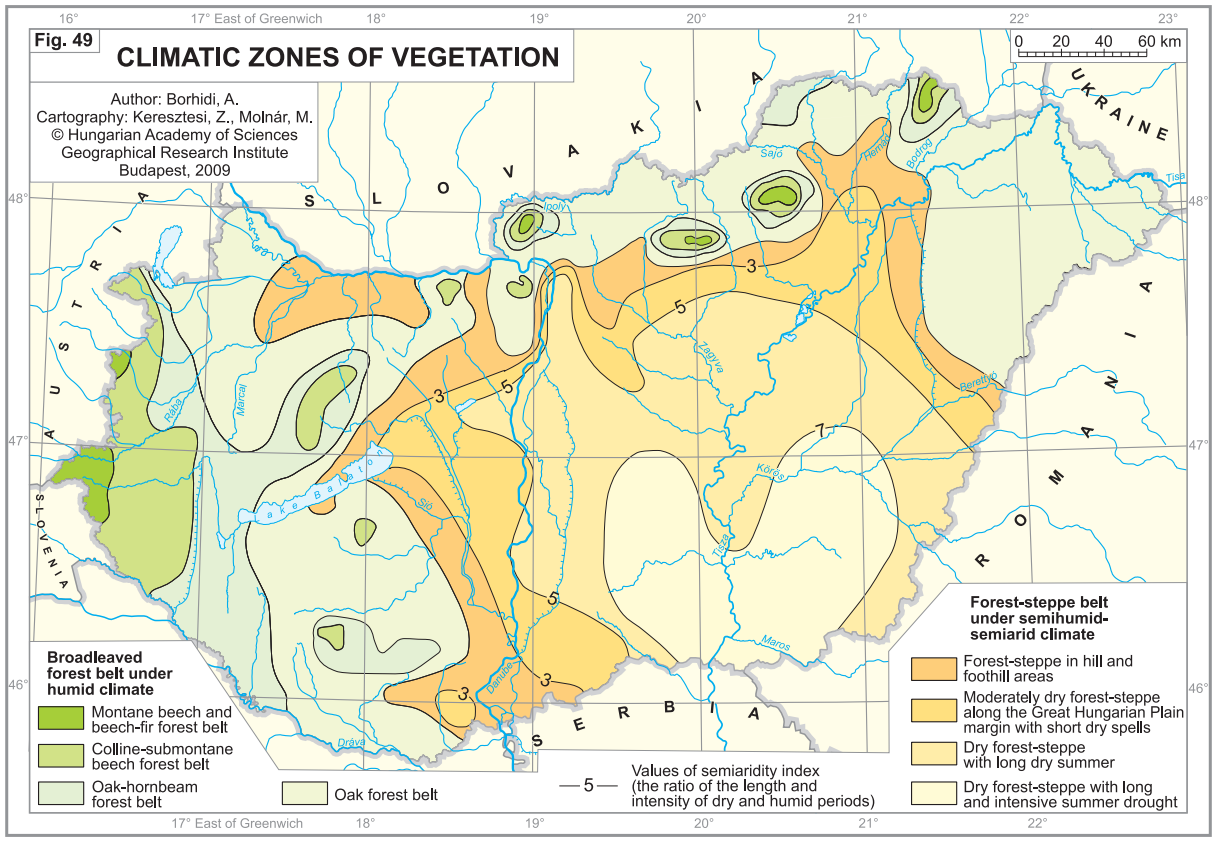
Geographical Research Institute
Budapest, 2009
0 20 40 60 km
UKRAINE
Boundary of flora province
Boundary of flora sector
Boundary of flora district
I Matricum
1 Tokajense
2 Tornense
3 Borsodense
4 Agriense
5 Neogradense
II Bakonyicum
1 Visegradense
2 Pilisense
3 Vesprimense
4 Balatonicum
III Praenoricum
1 Laitaicum
2 Castriferreicum
3 Petovicum
IV Eupannonicum
1 Arrabonicum
2 Colocense
3 Praematricum
4 Crisicum
5 Nyírségense
6 Samicum
7 Titelicum
V Praeillyricum
1 Saladiense
2 Somogyicum
3 Kaposense
4 Sopianicum
5 Villányicum
VI Noricum
1 Ceticum
2 Stryriacum
VII Carpathicum
1 Cassovicum

Vegetation Belts

Five vegetation belts can be distinguished and characterised, the same as climatic belts (*Figure 49*). Based on the climatic diagrams of Gaussen and Walter, the boundary between the zones of broad-leaved forests and forest steppe was drawn in the first step. Subzones within the forest belt can be identified by the position of the T: P=1:3 curve. First are those of the montane and the submontane beech forests, above and below 700 m a.s.l., respectively. Between 500 and 700 m the oak-hornbeam forest belt is to be found, whilst below 500 m the oak woodland belt is conditioned climatically. Where the summer months bring a semi-arid climate, the forest steppe dominates, which has less of a continental and more of a Submediterranean character, as regards its magnitude and distribution in temperature and precipitation, its climate being similar to the Pontian region. The duration and intensity of the dry season is illustrated by the semiaridity index values that range between 1 and 7.



Natural Vegetation

The recreation of the original and undisturbed state of vegetation (that dominated the Carpathian Basin prior to river regulation and intensive use of forests, meadows and forest steppes in the Alföld), is based on historical documents published by Zólyomi in 1967 (*Figure 50*). The map primarily indicates the climax forest associations and the characteristic mosaic-like landscapes of forest, grassland and shrub-woodland on the sand and loess *puszta*s

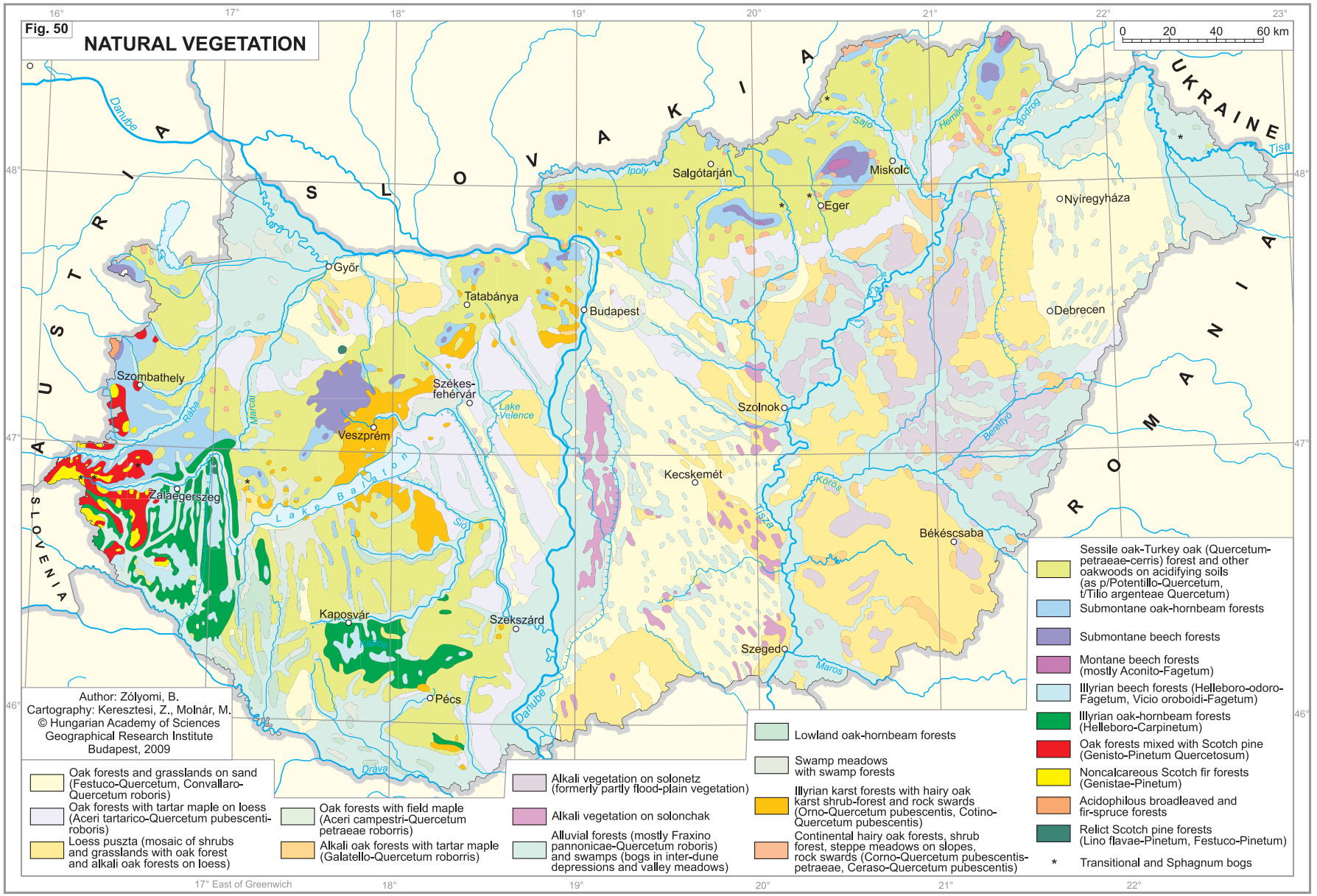


Fig. 50
NATURAL VEGETATION
0 20 40 60 km
16° 17° 18° 19° 20° 21° 22° 23°
48° 47° 46°
AUSTRIA
SLOVAKIA
UKRAINE
ROMANIA
SLOVENIA
Danube
Tisa
Győr
Tatabánya
Budapest
Salgótarján
Miskolc
Eger
Nyíregyháza
Debrecen
Szombathely
Székes-fehérvár
Veszprém
Lake Velence
Lake Balaton
Szolnok
Kecskemét
Zalaegerszeg
Békéscsaba
Kaposvár
Szekszárd
Szeged
Pécs
Author: Zólyomi, B.
Cartography: Keresztesi, Z., Molnár, M.
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Oak forests and grasslands on sand (Festuco-Quercetum, Convallaro-Quercetum roboris)
Oak forests with tartar maple on loess (Aceri tartarico-Quercetum pubescenti-roboris)
Loess puszta (mosaic of shrubs and grasslands with oak forest and alkali oak forests on loess)
Oak forests with field maple (Aceri campestri-Quercetum petraeae roborris)
Alkali oak forests with tartar maple (Galatello-Quercetum roborris)
Alkali vegetation on solonetz (formerly partly flood-plain vegetation)
Alkali vegetation on solonchak
Alluvial forests (mostly Fraxino pannonicae-Quercetum roboris) and swamps (bogs in inter-dune depressions and valley meadows)
Lowland oak-hornbeam forests
Swamp meadows with swamp forests
Illyrian karst forests with hairy oak karst shrub-forest and rock swards (Orno-Quercetum pubescentis, Cotino-Quercetum pubescentis)
Continental hairy oak forests, shrub forest, steppe meadows on slopes, rock swards (Corno-Quercetum pubescentis-petraeae, Ceraso-Quercetum pubescentis)
Sessile oak-Turkey oak (Quercetum-petraeae-cerris) forest and other oakwoods on acidifying soils (as p/Potentillo-Quercetum, t/Tilio argenteae Quercetum)
Submontane oak-hornbeam forests
Submontane beech forests
Montane beech forests (mostly Aconito-Fagetum)
Illyrian beech forests (Helleboro-odoro-Fagetum, Vicio oroboidi-Fagetum)
Illyrian oak-hornbeam forests (Helleboro-Carpinetum)
Oak forests mixed with Scotch pine (Genisto-Pinetum Quercetosum)
Noncalcareous Scotch fir forests (Genistae-Pinetum)
Acidophilous broadleaved and fir-spruce forests
Relict Scotch pine forests (Lino flavae-Pinetum, Festuco-Pinetum)
* Transitional and Sphagnum bogs
17° East of Greenwich

in the forest steppe belt. On the extensive floodplains of the lowlands, alluvial oak, ash, elm and poplar are to be found, along with wide areas of wetland and patches of bogs, all outlined by long borders of alkali soils covered by extrazonal desert-like alkali *puszta*s.

The zonal vegetation clearly reflects the elements of three climatic regions alternating and overlapping on Hungary's territory: a Central European climate, with marked Alpine influences in the west; Continental climatic features in the north-east; and Submediterranean climatic influences in the central and southern parts of the country, and over most of the Alföld. Accordingly, the medium-height beech and oak-hornbeam stands in the mountains are of a Central European character. In contrast, the most widespread associations are the oak forests, such as the turkey oak-sessile, hairy oak, as well as the mesophilous forests of South Transdanubia, that are related to the forests of the Balkan Peninsula. Typical of these are silver lime in the canopy, along with Butcher's Broom and other evergreens in the herb layer. In West Transdanubia a pine-oak woodland belt and even patches of fir-spruce forest reflect the Alpine influence. The composition of the forest steppe vegetation shows connection to the Ukrainian forest steppe belt in the north-east, while elsewhere, in particular on the Danube–Tisza Interfluve it resembles that of the Pontian steppe belt. The alkali *puszta*s share similarities with the plant associations of the Pontian semi-deserts.

Fauna

The Carpathian (Pannonian) Basin has some of the largest biodiversity of all European regions. Its geographically transitional position has resulted in a mixture of faunal elements, showing a wide variety concerning both origin and geographical history. The hilly areas surrounding the Alföld (Great Hungarian Plain), with their transitional climatic conditions, are populated by numerous, biogeographically important species. The southern, xerothermic slopes and foothills of the Transdanubian and North Hungarian Mountains served as a refuge for thermo-xerophilous elements during several cold and cool-humid climatic phases of the Quaternary, and as centres of their dispersal. Thus, many thermophilous elements probably populated the Carpathian Basin not only by long-distance colonisation from remote glacial refuges, but also from numerous meso- or microclimatically favourable sites, lying at the fluctuating borderlines of the Mediterranean refugial and periglacial belts. The biostratigraphical structure of the Hungarian late Pleistocene, often characterised by a coexistence of forest and non-forest faunal elements, provides evidence that demonstrates the transitional character of this region throughout the Quaternary.

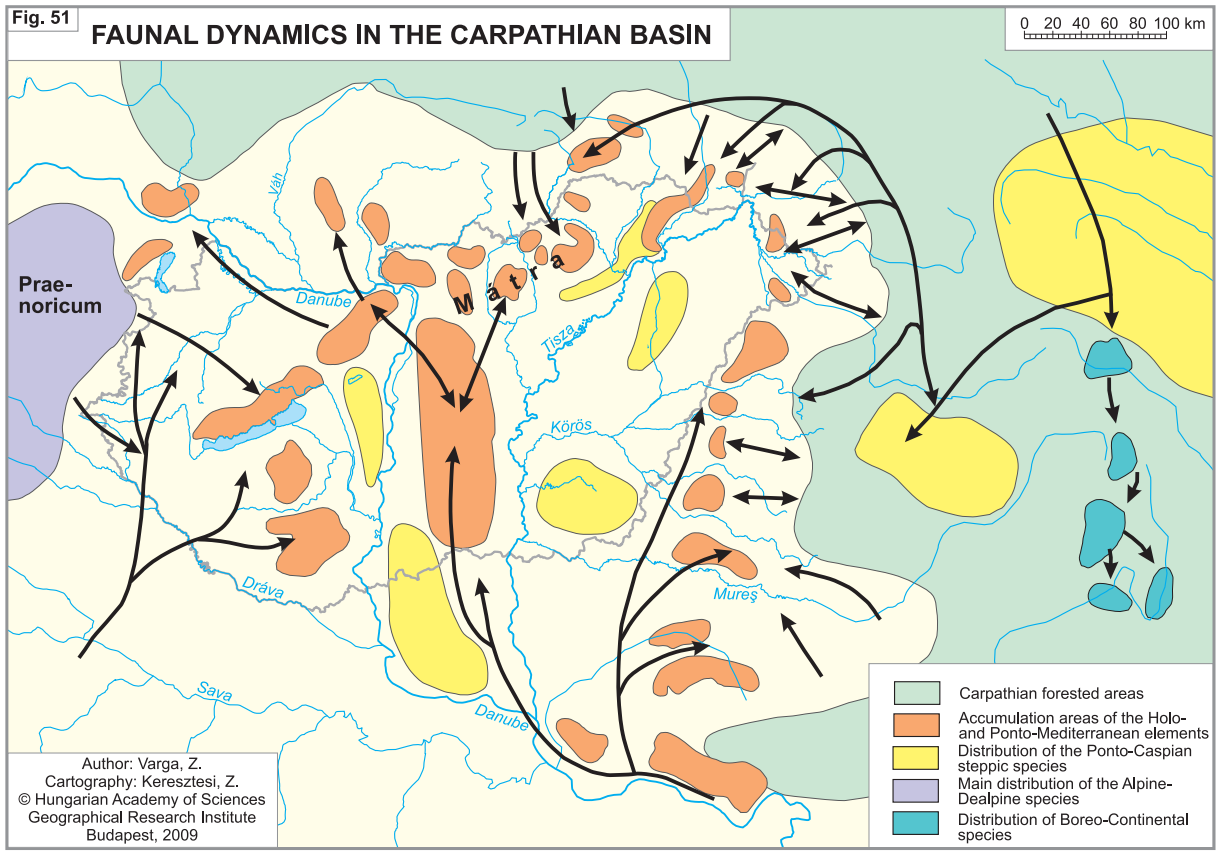
Endemic Taxa and Autochtonous Evolution in the Carpathian Basin

The Carpathian Basin belongs amongst the geologically youngest areas of Europe. There are, however, some taxonomical groups that are made-up to a considerable degree of endemic species, e.g. the land gastropods, the earthworms or some soil arthropods. Their core areas clearly coincide with the younger Tertiary land masses within and near to the Carpathian Basin. Most endemic species are narrow specialists, inhabiting extreme habitats, such as thermal springs, karstic caves and karstic springs. Several endemic troglobionta have been identified in gastropods, pseudo-scorpions, harvestmen, spiders and springtails, often occurring within a single or in a few caves of karstic mountains. The bulk of these endemic taxa are confined to the Eastern and Southern Carpathians, to the Apuşeni Mountains, that were able to preserve some endemic, and also several relict species of Isopoda and Diplopoda, in refugia without permafrost phenomena during the last glaciations.

Amongst the more mobile insect groups the proportion of endemism is rather low. Most endemic Lepidoptera of the Carpathian Basin belong to Microlepidoptera, which are strictly specialised to some food plants, living on halophyta in the saline grasslands of the Lake Fertő area, and on the Alföld (Kiskunság/Little Cumania and Hortobágy). However, the majority of endemics in the lower, hilly parts of the Carpathian Basin, represent thermophilous post-(inter?-) glacial relicts with connections to the Balkan Peninsula, Asia Minor or southern Russia. These facts clearly demonstrate that the Carpathians can be considered as a core area for the survival and autochtonous evolution of many Invertebrate groups of limited mobility.

Faunal Elements of the Carpathian Basin

Mediterranean species, as well as Submediterranean and Ponto-Mediterranean elements, occur mostly as marginal isolates in the Carpathian Basin (*Figure 51*). In particular, the island-like hilly re-

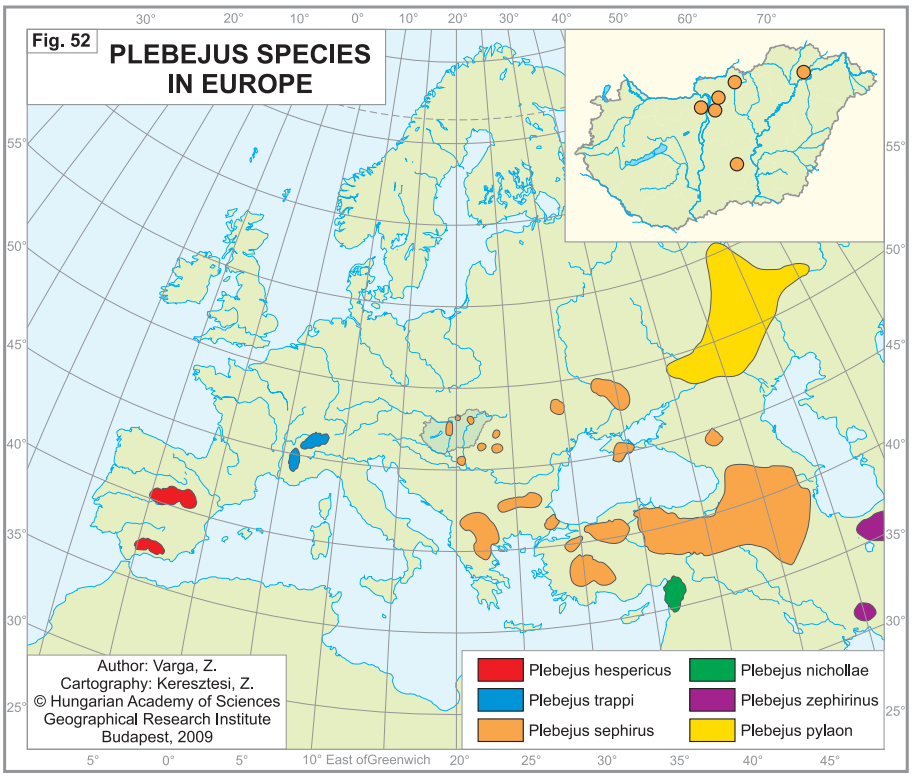


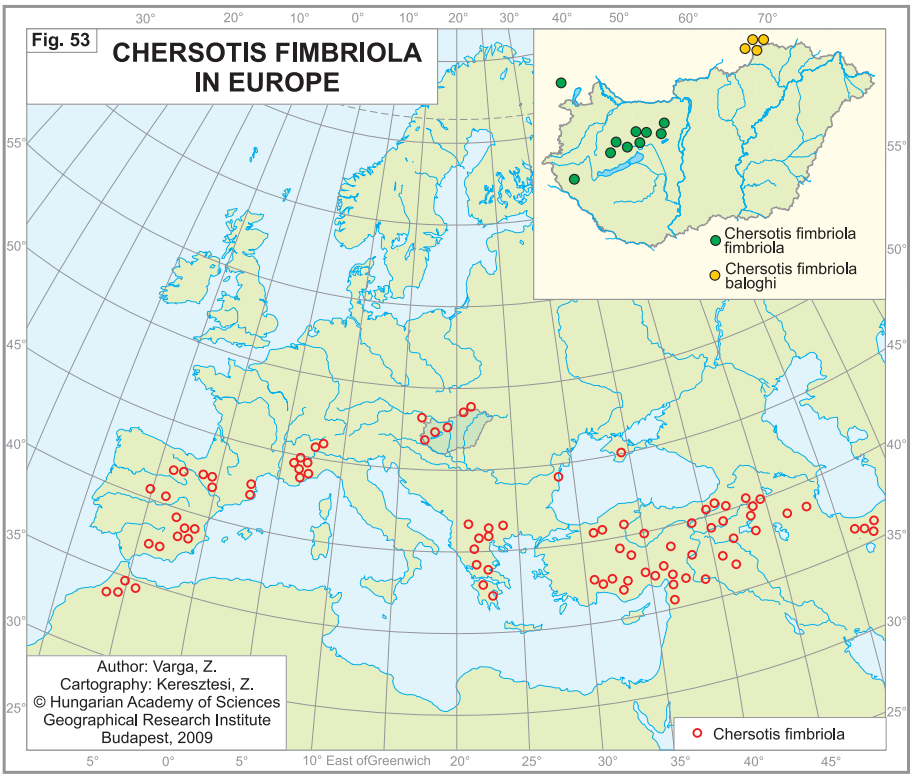
gions of South Transdanubia (Mecsek and Villány Mountains), and the xerothermic lanuginose oak forest and scrub-forest belts of the Transdanubian and North Hungarian Mountains are abundant in such (partly relict-like) elements. The richness of Mediterranean elements found in the calcareous sandy area of Kiskunság can be explained by its favourable meso-climatic character.

The influence of the eastern Balkans becomes apparent along the western border of the Apuşeni Mountains and also by the great rivers in the eastern part of the Alföld. The occurrence of some southern elements in the north-eastern part of the Alföld (e.g. Nyírség) can be explained by this dispersal route. Eastern Balkanic influences reach the warm foothill zone of the Transdanubian and North Hungarian Mountains by relict-like occurrences of some Balkanic and Balkanic-Anatolian elements.

Influences of the Ponto-Caspian steppe belts are also characteristic of the Carpathian Basin. Some of their elements are recent invaders, e.g. the butterfly *Colias erate*, dispersed during the last decennia. Other members of this group are threatened by the retreat and fragmentation of the extended grasslands, e.g. the great bustard, *Otis tarda* or the western mole-rat (*Nannospalax leucodon)* with three kariologically differentiated deme in the Alföld. Typical inhabitants of the steppe grasslands are often restricted to isolated sites of rupicolous and loess grasslands, e.g. the grasshoppers *Stenobothrus eurasius* and *Arcyptera microptera* and the subendemic bush-cricket *Isophya costata*. They can be regarded as relicts of the post-glacial steppe period, often corroborated by their geographical isolation, as well as by their taxonomical differentiation, e.g. *Vipera ursinii rakosiensis* or the Zephyr Blue (*Plebejus sephirus*), with isolated colonies in the Carpathian Basin (*Figure 52*).

Eremic species are restricted to the semi-desert-like habitats of the lowland with extreme edaphic conditions. There are very few vertebrates of this faunal type, e.g. the rodent *Sicista subtilis* and the short-toed lark, *Calandrella brachydactyla*. More examples can be found in phytophagous insects which are connected to halophytic plant communities. They are often represented by endemic Pannonian subspecies or allopatric sibling species of Turanic origin. The dispersal of this species group could have originally taken place in the late glacial (cryoxerotic) phases, with subsequent isolation as a result of the post-glacial expansion of the forest belt.





Last but not least, xeromontane elements are also present in the Carpathian Basin. The first main group is the Mediterranean-xeromontane species, represented by only a few Vertebrates (e.g. *Monticola saxatilis*), but by greater numbers of some insect groups, e.g. Noctuidae (examples of which are species of genera *Euxoa, Dichagyris* and *Chersotis: Figure 53*) and Orthoptera (e.g. *Paracaloptenus caloptenoides*). The second main group is the continental xeromontane type, represented by widely distributed Asiatic mountain steppe species and by relicts of the dolomitic rupicolous grasslands (Geometridae: *Phyllometra culminaria, Lignyoptera fumidaria*). Some genera, typical for the steppe biome, are probably of xeromontane origin (e.g. Lycaenidae: *Plebejus, Polyommatus;* Satyridae: *Chazara, Pseudochazara, Hyponephele;* Noctuidae: *Euxoa, Agrotis, Dichagyris, Chersotis*, etc.).

Nature Conservation

Hungary is a country rich in natural assets, thanks to its geographical location, geological history, geomorphological diversity and biogeographical situation. Its unique natural heritage is particularly evident when one examines some of its communities, plant and animal species, as well as caves.

The Hungarian natural environment clearly shares many of the general features of the Carpathian Basin, such as the diversity and mosaic-like pattern of habitats, their conservation status and the strong impact visible through social restructuring. The rich wildlife consists of a mix of Eurasian, European, Continental, Pontic, Submediterranean and Subatlantic flora and fauna. This heterogeneity is further diversified by certain Subalpine and Boreal elements as well as relic species. The large-scale, latitudinal zonation of habitats across the lowlands of East Europe are fragmented here into mosaic-structured landscapes each with an individual character, maintaining special habitats and association complexes.

Within the European Union, Hungary's land area represents the majority of a particular bioregional ecological complex, the Pannonic biogeographical region (or ***Pannonicum***). In addition to the fact that the contribution of Hungary's natural heritage is of utmost importance to the preservation of the region's natural values, it also means that Hungary shoulders the largest responsibility for their protection.

In September 2008, 9% of Hungary's territory was protected by national law, 16% of which was accorded 'strictly protected' status *(Figure 54, tables 6 and 7***).** All caves (4,077), springs (2,479), swallets (459), bogs (837), alkali lakes (317), tumuli (1,732) and earthen fortifications (378) are protected by the Act on Nature Conservation. In addition, 63 forest reserves have been designated as protected land.

Caves have been protected by law since 1961. 4,077 caves are known to exist in the country today, of which 147 have received 'strictly protected' status. The total length of all known passages is 234 km. Highlights include the large hydrothermal caves of the Budapest thermal karst with their extraordinarily rich formations, as well as the caves of the Bükk Mountains and the Aggtelek Karst. Since 2007, 11 of the 500 dif-

Table 6. ***Total extension of different categories of protected area (2003, 2008)***

Category of protected area	Number (pc)		Area (ha)	
	01.01.2003	30.09.2008	01.01.2003	30.09.2008
National parks	10	10	484,883	484,114
Landscape protection areas	36	37	309,817	323,167
Nationally protected nature conservation sites	142	163	25,927	29,226
Nationally protected natural monument	1	1	0	0
Total of natural areas protected by individual legislative acts	**189**	**211**	**820,627**	**836,507**
Nature conservation sites designated by local governments	1,225	1,296	36,700	39,464
Total of protected natural areas	**1,414**	**1,507**	**857,327**	**875,971**

Source: State Secretariat for Nature and Environment Protection, Ministry of Environment and Water (www.kvvm.hu)

Table 7. ***Land use types in nationally protected natural areas (01.04.2008)***

Category of protected area	Arable land	Grassland	Vineyard, garden and orchard	Reed	Fishpond	Forest	Uncultivated land	Total (ha)
National park	54,133.9	137,461.1	4,543.7	13,742.8	6,064.3	205,782.8	66,928.9	484,113.8
Landscape protection area	46,134.8	75,980.5	1,716.9	1,917.5	3,155.4	173,633.8	22,345.3	323,167.3
Nature conservation site	1,786.7	7,810.0	204.9	1,231.2	1,142.7	12,836.3	4,214.2	29,226.0
Total (ha)	**102,055.4**	**221,251.6**	**204.9**	**16,891.5**	**10,362.4**	**392,252.9**	**93,488.4**	**836,507.1**
Percentage of total	**12.2**	**26.4**	**0.02**	**2.0**	**1.2**	**46.9**	**11.2**	**100.0**

Source: State Secretariat for Nature and Environment Protection, Ministry of Environment and Water (www.kvvm.hu)

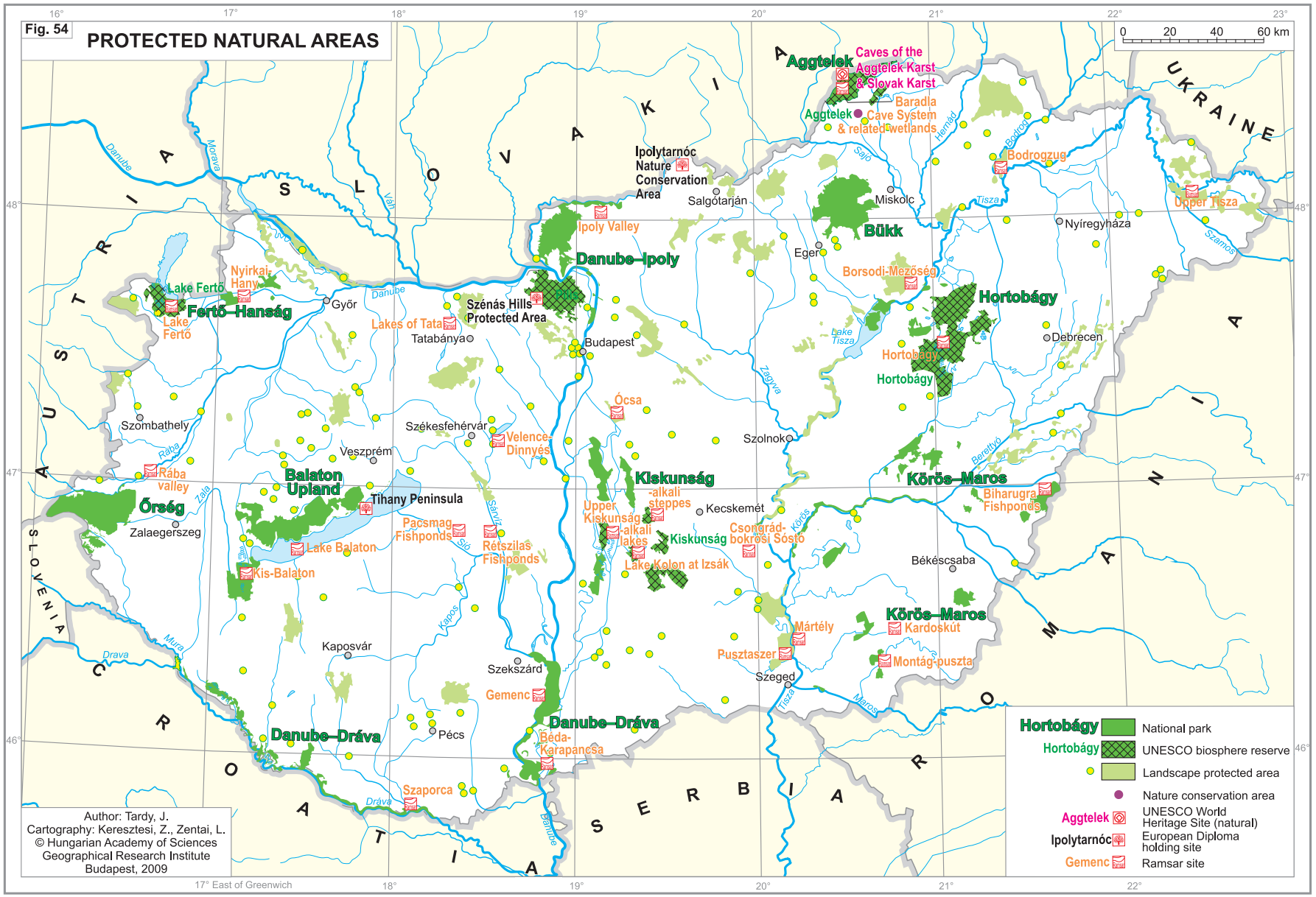


Fig. 54
PROTECTED NATURAL AREAS
0 20 40 60 km
Aggtelek
Caves of the Aggtelek Karst & Slovak Karst
Aggtelek & related wetlands
Baradla Cave System
Ipolytarnóc Nature Conservation Area
Ipoly Valley
Danube–Ipoly
Bükk
Bodrogzug
Upper Tisza
Borsodi-Mezőség
Hortobágy
Fertő–Hanság
Lake Fertő
Nyirkai-Hany
Szénás Hills Protected Area
Lakes of Tata
Tatabánya
Budapest
Győr
Eger
Miskolc
Salgótarján
Nyíregyháza
Debrecen
Szombathely
Veszprém
Székesfehérvár
Velence-Dinnyés
Ócsa
Szolnok
Balaton Upland
Tihany Peninsula
Rába valley
Őrség
Zalaegerszeg
Lake Balaton
Kis-Balaton
Pacsmag Fishponds
Rétszilas Fishponds
Kiskunság
-alkali steppes
Upper Kiskunság -alkali lakes
Kiskunság
Lake Kolon at Izsák
Csongrád-bokrosi Sóstó
Kecskemét
Körös–Maros
Biharugra Fishponds
Békéscsaba
Körös–Maros Kardoskút
Mártély
Pusztaszer
Montág-puszta
Szeged
Kaposvár
Szekszárd
Gemenc
Danube–Dráva
Béda-Karapancsa
Pécs
Szaporca
Author: Tardy, J.
Cartography: Keresztesi, Z., Zentai, L.
© Hungarian Academy of Sciences
Geographical Research Institute
Budapest, 2009
Hortobágy National park
Hortobágy UNESCO biosphere reserve
Landscape protected area
Nature conservation area
Aggtelek UNESCO World Heritage Site (natural)
Ipolytarnóc European Diploma holding site
Gemenc Ramsar site
17° East of Greenwich

ferent ***mineral types*** found within these caves are also protected. Two sites that possess a particularly rich geological heritage (Nógrád, Balaton-Bakony) have been accorded Geopark status. The karst, mineral and medicinal waters of the country are also of extraordinary value.

Natura 2000 Sites

Hungary's contribution to the ecological network of the European Union, known as '***Natura 2000***' and established in 1992, was formalised following the country's EU accession in October 2004. Amounting to 21% of Hungary's land area, or nearly 2 million hectares, the network contains 1.4 million ha of Special Protection Areas (15% of the nation's territory) and 1.35 million ha designated as Sites of Community Importance (14.5%) *(Figure 55)*. In the frame of the European Ecological Network (EECONET) born in Maastricht (1993) Hungary also established its own ***National Ecological Network*** (*Figure 56*), which was enforced in the Act XXVI of 2003 on National Regional Development Plan.

Conservation Status

Over 30% of the country's terrain consists of a variety of important habitats in near-unspoilt condition and/or giving home to species of major interest to conservation. However, of the 46 Annex I ***natural habitat*** types to be found in Hungary, only 11% were in a 'favourable' conservation condition according to the 2007 assessment carried out under the guidance of the European Commission, while 20% were in an 'unfavourable' and 67% in a 'bad' condition. The 211 ***species listed by the Habitats Directive*** received the following conservation assessment: 25% favourable, 47% unfavourable and 12% bad.

A number of plant associations, including all natural forest associations and approximately 20–25% of their species can be considered to be under threat. However, Hungary's natural heritage still stands up very well to international comparison.

With regards to future trends, the ecological impacts of ***climate change*** are barely predictable, but it is important to be aware of the sensibility and vulnerability of our ecological systems. It is expected that the boundaries of vegetation zones will shift, the ranges of native species will shrink and the encroachment of invasive species will, in the long run, decrease biodiversity. It is wetlands that are most exposed to climate change.

Native, self-sustaining ecosystems are present in relatively isolated locations within the Carpathian Basin, further increasing their susceptibility and vulnerability to the impacts of climate change. This highlights the importance of ecological connections among areas giving home to native wildlife, by maintaining or restoring migration corridors.

Ownership and Management of Protected Areas

In 1990, the Hungarian National Authority for Nature Conservation had management rights over only 19,500 ha of protected land. By 2008, this area had extended over 275,708 ha (of which

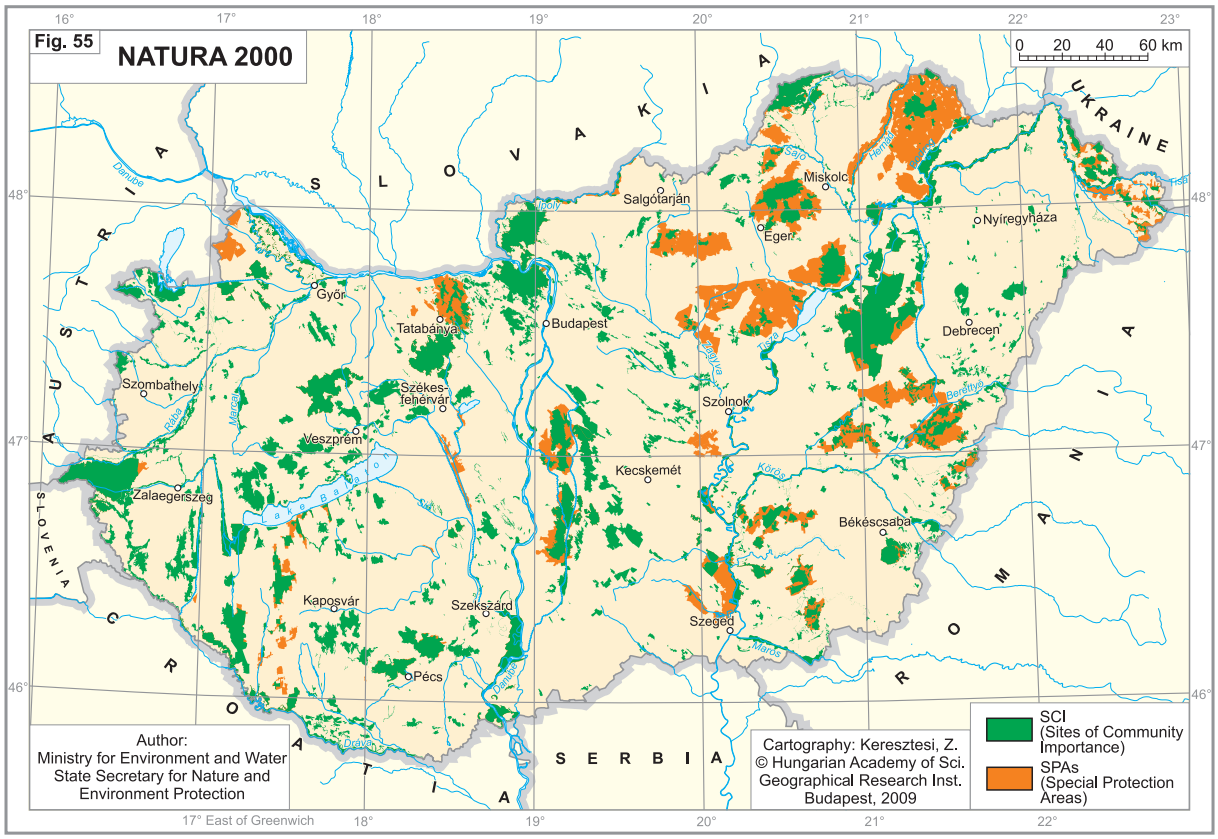


Fig. 55
NATURA 2000
0 20 40 60 km
Author:
Ministry for Environment and Water
State Secretary for Nature and
Environment Protection
Cartography: Keresztesi, Z.
© Hungarian Academy of Sci.
Geographical Research Inst.
Budapest, 2009
SCI
(Sites of Community
Importance)
SPAs
(Special Protection
Areas)
17° East of Greenwich
SLOVAKIA
UKRAINE
AUSTRIA
SLOVENIA
CROATIA
SERBIA
ROMANIA
Budapest
Miskolc
Debrecen
Szeged
Pécs
Győr
Tatabánya
Székesfehérvár
Szombathely
Veszprém
Zalaegerszeg
Kaposvár
Szekszárd
Kecskemét
Békéscsaba
Salgótarján
Eger
Nyíregyháza
Szolnok

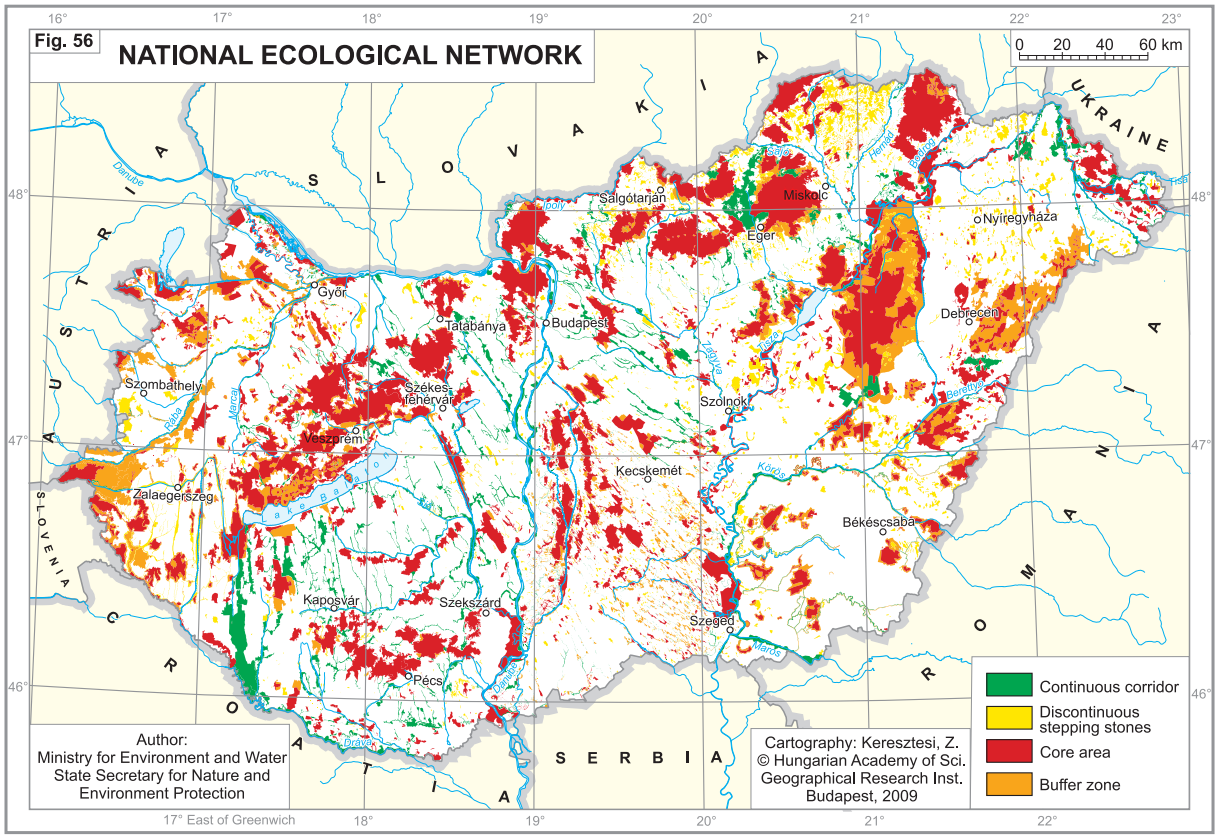
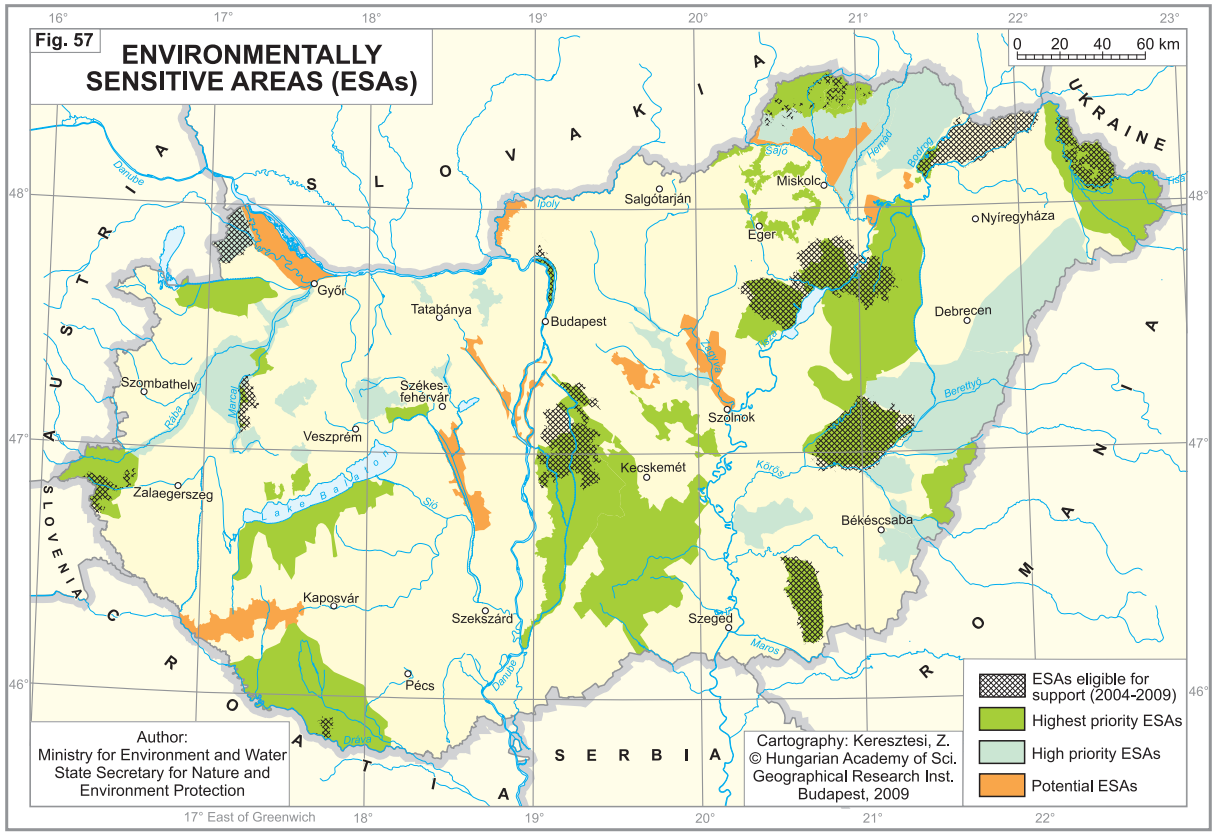


Fig. 56
NATIONAL ECOLOGICAL NETWORK
0 20 40 60 km
Author:
Ministry for Environment and Water
State Secretary for Nature and
Environment Protection
Cartography: Keresztesi, Z.
© Hungarian Academy of Sci.
Geographical Research Inst.
Budapest, 2009
Continuous corridor
Discontinuous
stepping stones
Core area
Buffer zone
17° East of Greenwich
SLOVAKIA
UKRAINE
AUSTRIA
SLOVENIA
CROATIA
SERBIA
ROMANIA
Budapest
Miskolc
Debrecen
Szeged
Pécs
Győr
Tatabánya
Székesfehérvár
Szombathely
Veszprém
Zalaegerszeg
Kaposvár
Szekszárd
Kecskemét
Békéscsaba
Salgótarján
Eger
Nyíregyháza
Szolnok

33,504 ha was forest) of particularly valuable protected land, preserved for the nation under the management of the national park directorates.

The national park directorates are responsible for game management in nearly 155,000 ha of protected area. The cornerstone of the management of protected grassland is the attention given to the proper density and species (or even breed) of grazing animals. Significant quantities of native Hungarian livestock breeds, graze in the areas managed by the national park directorates, such as Hungarian Grey Cattle, water buffaloes, native sheep breeds (racka, cigája and cikta), as well as Hungarian Pied cattle. The Aggtelek National Park provides a habitat for Hutsul ponies, while the Hortobágy National Park is home to Przewalski horses and the Nonius stud.

A fundamental issue for Hungarian nature conservation is its harmonious co-existence with agriculture, regional policy, infrastructure development and tourism. The national nature conservation authority undertakes major projects for ecotourism, and also supports traditional landscape management by successfully running the '***Environmentally Sensitive Areas***' scheme, through EU-funded agri-environmental allotment for the management of 120,000 ha *(Figure 57)*.



The Legislative and Institutional Background to Hungarian Nature Conservation

Hungary's first national park (Hortobágy, 1973) followed 101 years after the foundation of Yellowstone National Park (USA, 1872), the world's first. However, the history of Hungarian nature conservation goes back much further back, to 1426 when Sigismund of Luxembourg, the then King of Hungary ordered by decree the considerate management of forests and the protection of soils against erosion. The 1729 decree of Charles III regulated hunting and the capture of birds, whilst an article of the 1790 decree of Leopold II aimed to prevent the destruction of

forests. The 1879 Act on Forests laid down regulations applicable to the songbird trade, whilst in 1883 an act was passed on hunting, and on the protection of songbirds. In 1893, the famous Hungarian naturalist, Ottó Herman established the Hungarian Ornithological Centre. The first ordinance on bird protection was issued in 1901, providing legal protection to 132 bird species and a few species of mammals. In 1906, Parliament ratified the 1902 Paris Convention for the Protection of Birds useful to Agriculture.

The first high-level, comprehensive law on nature conservation in Hungary was the 1935 Act on Forests and Nature Conservation that provided for the protection of certain plant and animal species as well as natural areas and habitats. In 1939, the designation of certain sites of outstanding natural value began. The Minister for Agriculture issued a decree in 1946 to provide for the surveillance and wardening of several particularly precious reserves. The National Nature Conservation Council was established in 1950. Four years later, a government decree regulated the protection of birds.

Act decree No 8 of 1961 was the first to provide an exclusive framework for the regulation of nature conservation. From that year a separate act designated all caves protected by law. The National Authority for Nature Conservation was set up in 1962 and was transformed into the National Environmental and Nature Conservation Authority in 1977. A 1982 decree contained lists of 'protected' and 'strictly protected' plant and animal species, the theoretical value of their individuals, as well as the list of 'strictly protected' areas. The National Authority for Nature Conservation within the Ministry of Environment and Water Management inherited nature conservation responsibilities in 1990, which it held until 2006 in the capacity of a central (governmental) body. Today, the central governance, co-ordination and supervision of nature conservation at a national level are the direct responsibility of the Ministry of Environment and Water Management.

Sites Designated Under International Conventions

As signatory to numerous international conventions on nature conservation, Hungary's responsibilities towards the natural environment are codified in conventions such as the ***Washington Convention*** on International Trade of Endangered Species (CITES, 1985), the ***Ramsar Convention*** on Wetlands (1979), the ***Convention on Biological Diversity*** (CBD, 1995), the ***Bonn Convention*** on Migratory Species (1986) and the agreements made for its implementation, the ***Bern Convention*** on the Conservation of European Wildlife and Natural Habitats (1990), the ***European Landscape Convention*** (2005), and the ***Carpathian Convention*** (2005).

Presently, 28 Hungarian sites are designated as wetlands of international importance, with a total area of 233,928 ha. These ***Ramsar sites*** are almost all part of the 'Natura 2000' network. A Hungarian proposal made it possible to include subterranean wetlands under this convention, such as the Hungarian/Slovakian Baradla-Domica cave system.

In the framework of UNESCO's ***MAB ('Man and the Biosphere')*** programme launched in 1970, five biosphere reserves have been designated (Aggtelek, Fertő, Hortobágy, Kiskunság and Pilis) with a total area of 130 thousand hectares. The Hungarian/Croatian Mura-Drava-Danube biosphere reserve is being prepared for addition to this list.

Hungary joined the ***UNESCO Convention on World Heritage*** in 1985. Currently one natural attraction (Caves of the Aggtelek Karst and Slovak Karst, 1995) and seven cultural locations are included in the World Heritage List: Budapest, including the banks of the Danube, the Buda Castle District and Andrássy Avenue (1987); the old village of Hollókő and its surroundings (1987); the Millenary Benedictine Abbey of Pannonhalma and its natural environment (1996); Hortobágy National Park – the Puszta (1999); the Early Christian Necropolis of Pécs (Sopianae) (2000); Fertő–Neusiedlersee Cultural Landscape (2001) and the Tokaj Wine Region Historic Cultural Landscape (2002).

Environmental Protection

Shifts in social and economic conditions within Hungary from the mid-1980s onwards, and the effects of the regime change in 1989, curbed a hitherto intense environmental deterioration and put an end to severe contamination in a number of fields. As a result of this, a decreasing environmental toll has led to the improvement in the quality of the environment.

Air Pollution

In the 1980s a huge, contiguous strip of severely polluted air stretched along the north-east–south-west industrial axis, amidst the North Hungarian and Transdanubian Mountains, enveloping the cities of Miskolc, Budapest and Veszprém to the extent that ***air pollution*** endangered the health of nearly half of Hungary's population. Due to a decrease in the emission of air pollutants, areas with extremely high levels of air pollution are now only found in small and scattered patches. Since 2000, the proportion of national territory with poor ambient air quality has fallen from 11% to 6.3%, and the share of the population affected by air pollution has dropped from 40% to 35.9%. The rate of improvement is best seen when comparing levels of sulphur dioxide emissions. In 1980 SO_2 emissions reached 1.633 million tons, whereas in 2006 only 118,000 tons were emitted, representing a 93% reduction. The emission of nitrogen oxide decreased from 238,000 tons in 1990 to 208,000 tons in 2006, mainly due to the restructuring of the power sector.

Over the period between 1980 and 2006, *emissions of particulate matter* (PM) decreased from 576,600 tons to 83,000 tons (i.e. from 54 kg to 8 kg per capita). The most severely polluted mosaics were found in the vicinities of Budapest, Miskolc, Salgótarján, Pécs and Szeged (*Figure 58*). Since the 1990s, air pollution from transport has begun to endanger settlements near motorways and major roads. *Suspended PM* poses an extensive problem in Hungary. In 2007 the highest concentrations of PM were measured in cities such as Budapest, Miskolc, Pécs, Szeged and Várpalota. High PM concentrations are mainly linked to heavy traffic, residential heating and, in some places, to local industrial production. Background concentrations of SO_2 have been considerably reduced following the trend in declining emissions. In 2007, SO_2 emission limits were being respected throughout Hungary. Background concentrations of NO_2 have been slightly reduced in recent years, however the annual average immission level were exceeded in Budapest, Miskolc and Pécs.

Ground-level ozone is a major concern throughout the country. In 2007 health protection standards were exceeded at all ozone monitoring stations; the highest exceedance rates occurred in Budapest, Dunaújváros, Kazincbarcika, Salgótarján and Tatabánya.

Ragweed pollen (Ambrosia artemisiifolia) potentially affects Hungarians who suffer from respiratory diseases or allergies. In 2004–2005 the country's ragweed cover and airborne pollen levels generally dropped, but both increased again in 2006. In 2008, the highest daily concentrations of ragweed pollen (measured in pollen grains/m^3) were registered in Nyíregyháza (1,015), followed by Szeged (976), Kecskemét (968) and Győr (957) (*Figure 59*).

With regards to climate change, the reduction in *greenhouse gas* emissions from 115.8 million tons in 1990 to 78.6 million tons in 2006 is notable (-32%). The most significant reduction took place between 1988–1992 due to the collapse of energy intensive industries and the restructuring of the Hungarian economy. Such a considerable decrease has also come about as a result of changes in the energy generation mix. To meet future climate change challenges, the

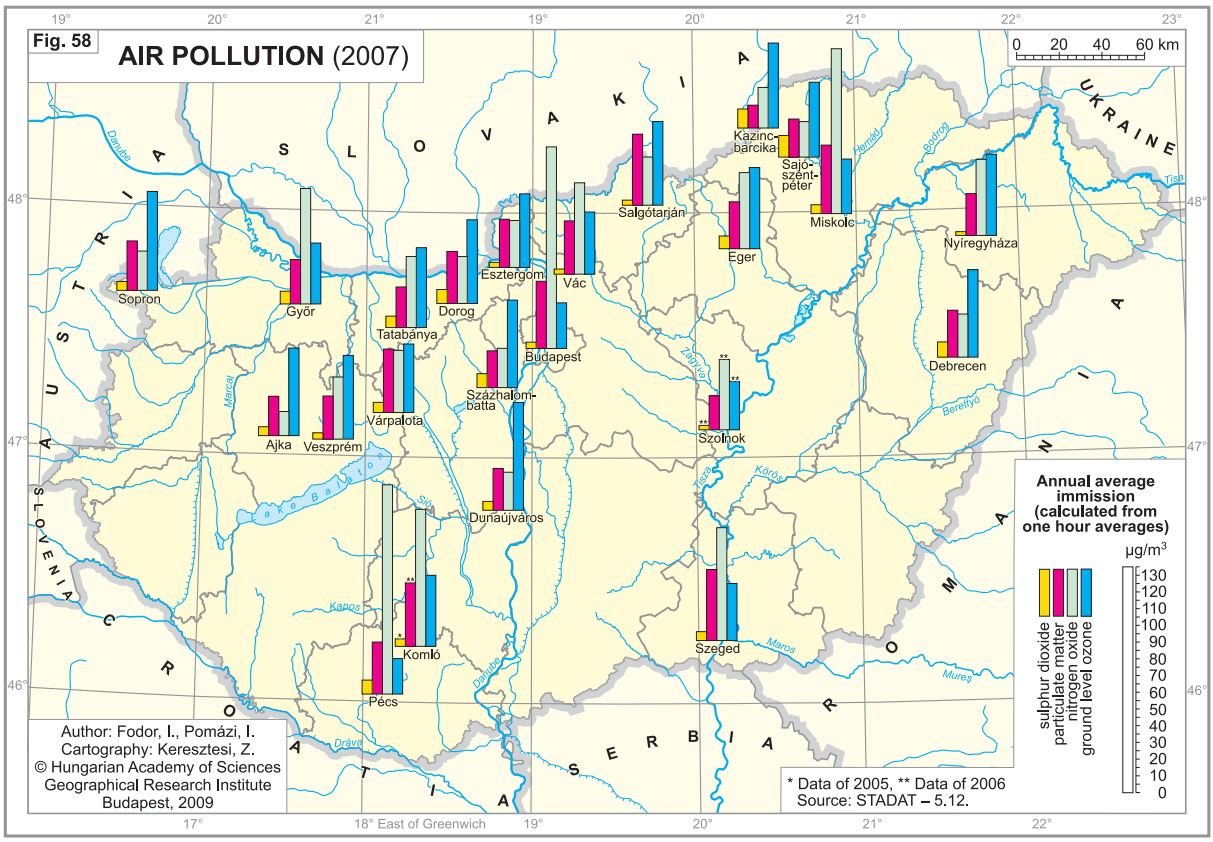


Fig. 58
AIR POLLUTION (2007)
0 20 40 60 km
Sopron
Győr
Tatabánya
Dorog
Esztergom
Vác
Budapest
Százhalombatta
Ajka
Veszprém
Várpalota
Komló
Pécs
Dunaújváros
Salgótarján
Kazincbarcika
Sajószentpéter
Miskolc
Eger
Szolnok
Szeged
Nyíregyháza
Debrecen
Annual average immission (calculated from one hour averages)
µg/m3
sulphur dioxide
particulate matter
nitrogen oxide
ground level ozone
130
120
110
100
90
80
70
60
50
40
30
20
10
0
* Data of 2005, ** Data of 2006
Source: STADAT – 5.12.
Author: Fodor, I., Pomázi, I.
Cartography: Keresztesi, Z.
© Hungarian Academy of Sciences
Geographical Research Institute
Budapest, 2009
18° East of Greenwich
AUSTRIA
SLOVAKIA
UKRAINE
HUNGARIA
SLOVENIA
CROATIA
SERBIA
Danube
Tisza
Marcal
Rába
Sió
Zagyva
Hernád
Bodrog
Berettyó
Körös
Maros
Mureş
Kapos
Dráva

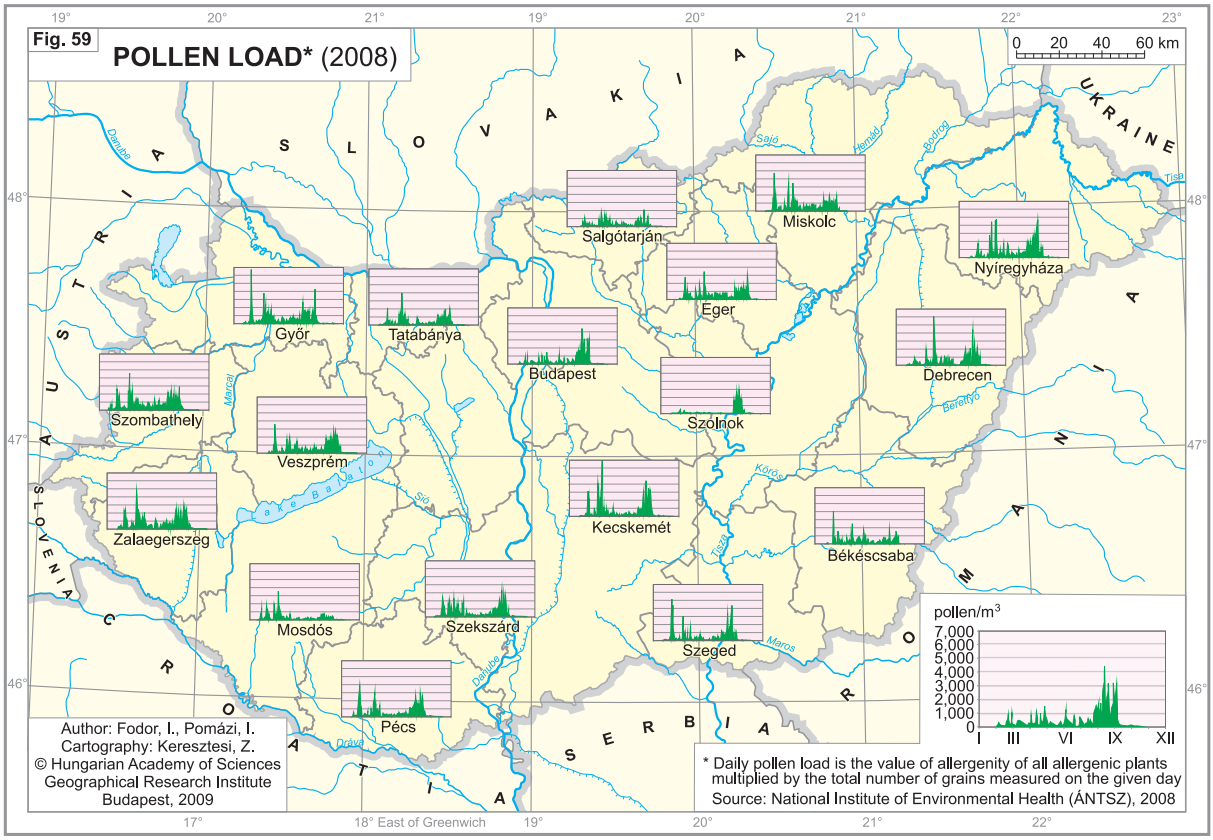


Fig. 59
POLLEN LOAD* (2008)
0 20 40 60 km
Salgótarján
Miskolc
Nyíregyháza
Eger
Győr
Tatabánya
Budapest
Debrecen
Szombathely
Szolnok
Veszprém
Kecskemét
Zalaegerszeg
Békéscsaba
Mosdós
Szekszárd
Szeged
Pécs
pollen/m3
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
I III VI IX XII
* Daily pollen load is the value of allergenity of all allergenic plants multiplied by the total number of grains measured on the given day
Source: National Institute of Environmental Health (ÁNTSZ), 2008
Author: Fodor, I., Pomázi, I.
Cartography: Keresztesi, Z.
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Geographical Research Institute
Budapest, 2009
18° East of Greenwich
AUSTRIA
SLOVAKIA
UKRAINE
HUNGARIA
SLOVENIA
CROATIA
SERBIA
Danube
Tisza
Marcal
Rába
Sió
Sajó
Hernád
Bodrog
Berettyó
Körös
Maros
Mureş
Kapos
Dráva

Hungarian Parliament unanimously adopted the National Climate Change Strategy in March 2008. Prior to 1990 seventeen coal-fired thermal power stations were in operation, whereas by 2008 only one remained that was exclusively coal-fired. Currently there are ten mixed-fuel power plants (using mostly natural gas, biomass and coal), four that operate on natural gas and oil, whilst two power plants were permanently decommissioned. Between 1998 and 2006, state expenditure for the purposes of landscape rehabilitation amounted to HUF 20.52 billion (approximately EUR 8 million at current exchange rates), in the wake of terminating uranium ore mining in the Mecsek Mountains. The funding primarily covered tasks related to pollution abatement and clean-up of the site.

The quality of the natural environment suffered severely as a result of the *activities of the armed forces* prior to 1989. The former Soviet Army had completed their gradual withdrawal from military bases in Hungary by 1991. After their departure, 171 registered and abandoned military objects remained in the country and Hungary spent around HUF 5 billion on pollution abatement, site clean-up and landscape rehabilitation in the period 1994–2006.

Water Pollution

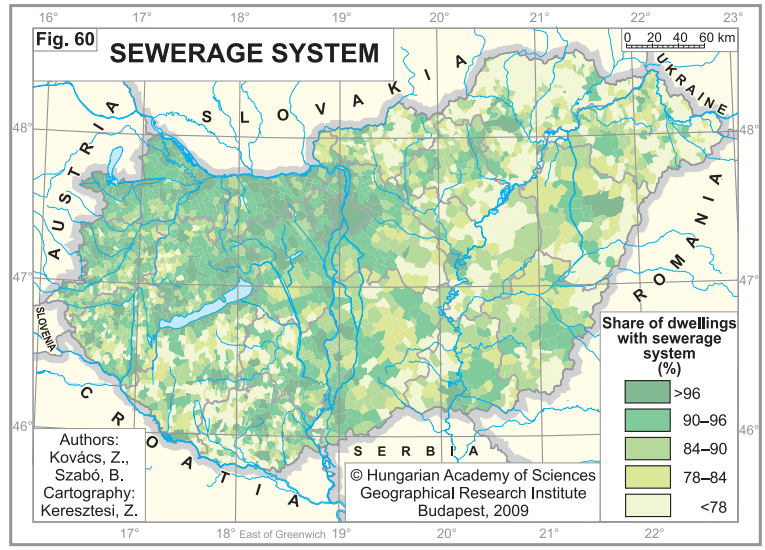
About 95% of Hungary's surface waters originate abroad and its borders are crossed by 24 incoming rivers, which bring 114 km^3 of water annually. The risk of surface water pollution is still grave and widespread, especially by nutrients and hazardous substances. The Danube generally has good water quality with regard to chemical pollutants, whereas the Tisza is contaminated by mercury and zinc. Bacterial contamination still prevails in large rivers (e.g. Danube and Tisza).

Some 60% of the Danube and 90% of the Tisza are accorded 'quality class IV' (polluted) for microbiological parameters and about 80% of the Tisza's length is accorded qualities IV and V (extremely polluted) for micro-pollutants.

Groundwater accounts for only 16% of total water abstractions, but it provides almost the entire drinking water supply of the country (40% is bank-filtered, about 10% is shallow groundwater and the rest is held in deep aquifers). Shallow groundwater is mostly affected by nitrates originating from agriculture and untreated municipal waste water.

A national river basin management plan is being prepared, in order to implement the EU Water Framework Directive. Hungary is a country prone to inundation and with the largest flood protection system in Europe (more than 4,200 km). In the last decade the country has taken significant steps towards reducing its vulnerability to flood hazards, including the preparation of flood prevention and mitigation plans, and the revision of land use planning and local construction regulations.

Despite the progress made in extending the water supply and improving purification technology, 23% of drinking water (supplying 900 settlements with 2.5 million inhabitants) does not comply with EU standards for ammo-



nium, arsenic, nitrite, fluoride, boron, iron and manganese content. The volume of municipal liquid waste produced in settlements without sewerage systems totals 100 million m^3 annually. Approximately 95% of this seeps into the soil from poorly or incorrectly constructed septic tanks. Statistics reported 4.69 million m^3 of collected ***municipal liquid waste*** in 2007. The regional distribution in the volumes of municipal liquid waste can be explained by the widening gap between the availability of piped drinking water and of a sewerage system, over the period 1945–1995. The drinking water network was completed by the mid-1990s: by 2007, 94.7% of dwellings were being supplied by piped water and 69.8% of them were connected to the sewerage network. The amount of municipal liquid waste decreased during the period 1990–2007 with the extension of the sewerage system, yet certain spatial disparities continue to exist (*Figure 60).*

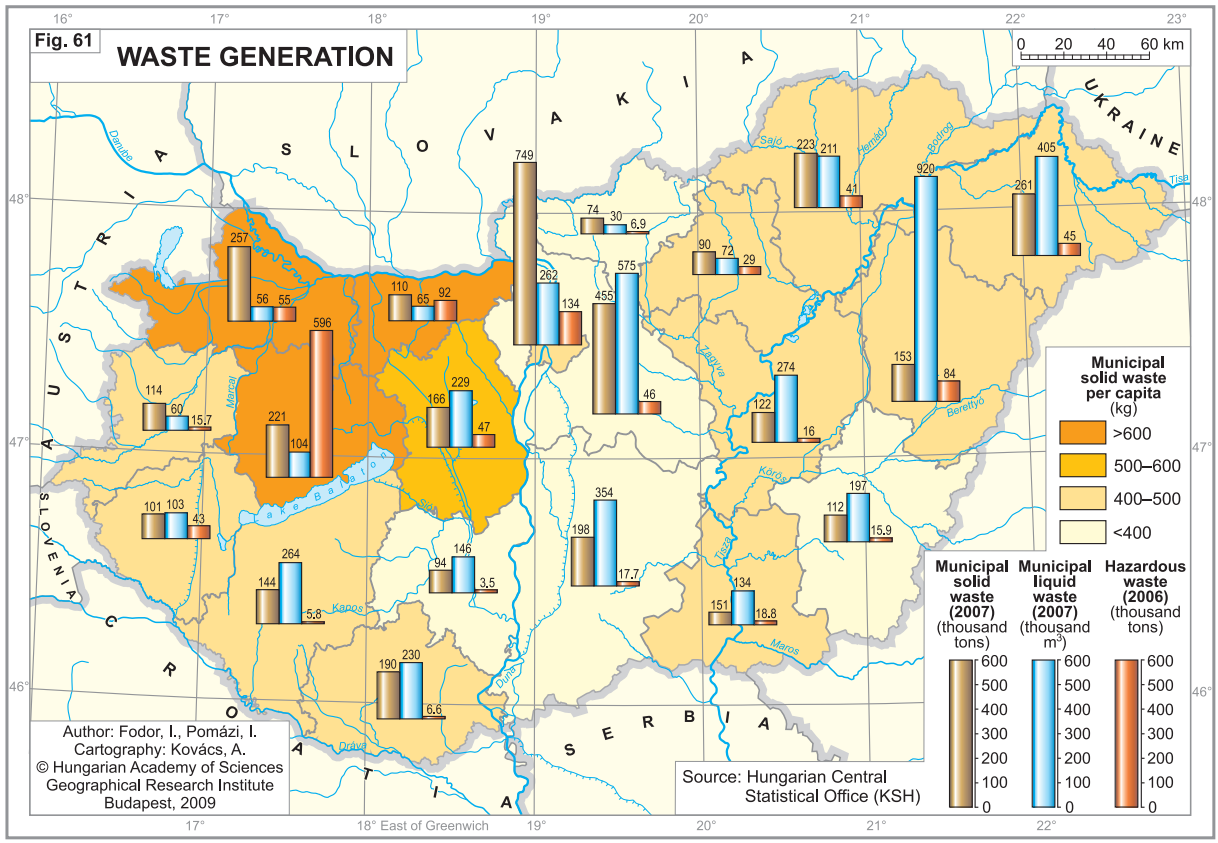
Waste Management

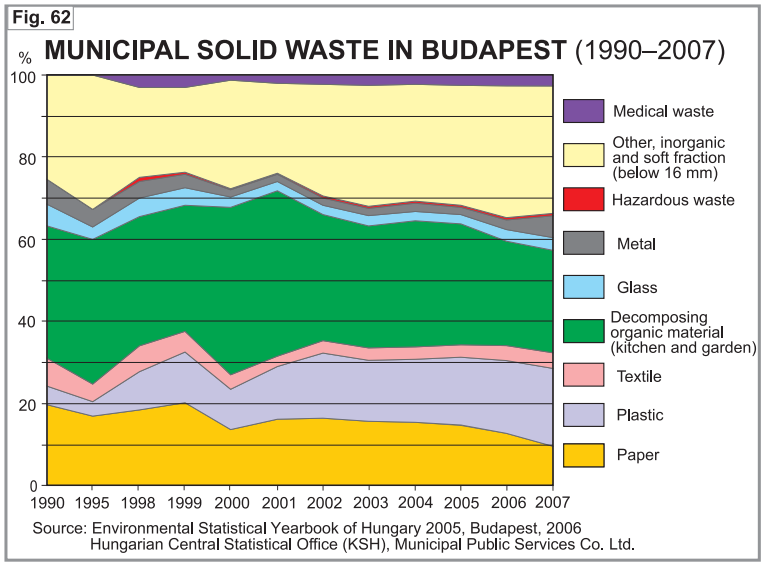
Waste management bears a special significance as far as the quality of the environment is concerned and in 1990 Hungary inherited severe problems in this field as well. The amount of waste being produced by industry and municipalities has been steadily decreasing since the 1980s. In 1990 this amount was 106 million tons, deposited in approximately 2,700 legal landfills. There are not even estimates available as to the number of illegal dumps. Due to economic restructuring, the total quantity of waste had reduced to 90 million tons by 1995, and further reduced to 68.7 million tons in 2000.

Industrial and commercial waste includes the waste material of various technologies and their by-products. Before 1989 the annual amount of waste from production activities reached 100 million tons. By 1992 production waste totalled a yearly 80 million tons, and by 1994 it had reduced to two thirds of the 1989 quantity. Approximately 500 million tons of industrial waste (99% deriving from mining, iron ore smelting, steel manufacturing, electricity production, and construction) has been deposited in old landfills. These have been shut and are today mostly reclaimed. An estimated 7% of the waste deposited in landfills qualifies as hazardous, and 90% of it is red mud from alumina extraction, whereas the remaining 10% is drilling mud.

Present-day waste management is regulated by the Waste Management Act of 2000. The National Waste Management Plan (2003–2008) sought to minimise the generation of waste, including hazardous waste. These days of a total of 26.6 million tons of waste material, municipal waste accounts for 4.7 million tons and there is 1.36 million tons of hazardous waste. Industrial and commercial waste amounts to 20.5 million tons, and is properly treated.

The amount of collected ***municipal solid waste*** increased by 188% in the period 1990–2007 (200.9 kg/person in 1990, rising to 466.9 kg/person in 2007) yet there are significant regional differences behind this data (*Figure 61)*. The increase can be attributed to economic restructuring, changes in the standard of living and consumer habits, as well as to the fact that most settlements (except for major cities) did not have organised refuse collection before 1990. The annual per capita amount of collected municipal solid waste is especially high (over 600 kg/person) in the counties of Komárom-Esztergom, Veszprém and Győr-Moson-Sopron. Such high quantities occur for a variety of reasons including changing consumer habits, and thanks to different heating systems, since central or gas heating does not facilitate the burning of otherwise combustible waste. In small settlements, however, municipal solid waste is handled locally, which is reflected in the low quantities for Békés or Bács-Kiskun counties. The composition of municipal solid waste in Budapest is shown in *Figure 62.* Analyses show that the nationwide constituents of waste largely mirror that of Budapest. In 2007 decomposing organic matter was the highest proportion of communal solid waste (24.5%), followed by plastics (18.3%) and paper (6.5%). Metal and glass represent the low-





est percentages. The total amount of recycled material maintains these proportions. In order to facilitate selective waste collection 4,000 recycling collection points and 74 waste collection yards are available in 500 settlements.

The quantity of ***hazardous waste*** has been gradually decreasing since the early 1990s due to industrial restructuring. The aluminium industry, one of the major sources of such waste, has dwindled significantly, thus the quantity of red mud as its residue has decreased too. Hazardous waste output has diminished by 49% in the period 1996–2006. The most significant decrease occurred in South Transdanubia, as the amount of hazardous waste per person was nearly 30 times less in 2006 than in 1996. Major causes of the decrease include the closure of excessively polluting, large-scale industrial works, e.g. uranium mines and enrichment facilities, coal mines, tanneries, shoe factories and other chemical plants. Low values are typical of the Somogy and Tolna counties for similar reasons. The impact of industrial restructuring has resulted in an identically significant decrease in the counties of Komárom-Esztergom and Győr-Moson-Sopron. Obsolete and outdated technologies were replaced with new manufacturing plants. In contrast, the amount of hazardous waste has largely increased in Hajdú-Bihar County with the expansion of the pharmaceutical works. Out of all the counties, it is Veszprém, with its outdated industry that was responsible for the

largest amount of hazardous waste after 2006. Hazardous waste produced in 1997 barely reached 23% of the 1990 levels.

In Hungary, only the nuclear power station at Paks uses nuclear fuel for electricity generation. Annually 58.6 tons of spent nuclear fuel elements are produced here, along with approximately 100 m^3 of solid and 250 m^3 of liquid waste of low and intermediate levels of radioactivity. These hazardous waste materials are professionally treated (in hazardous waste incinerators, chemically safe waste dumps and temporary containers). In 1999, about 950 kg of chemicals per capita were produced in Hungary, one third of which was toxic. By 2006 the total quantity produced had increased by 15% while that of toxic chemicals grew by one third.

Environmental Conflicts and Policy

The most serious ***environmental conflicts*** in the period 2000–2009 gained publicity from the campaigns of environmental activists and mass media, as they ran counter to the interests of environmental protection, and this is something in which civil society has played a significant role. Among transboundary conflicts, the cyanide pollution of the Someş (Szamos) and Tisza rivers in Romania (by the gold mine in Baia Mare/ Nagybánya) in January 2000, and the heavy metal pollution of the same rivers in March of the same year, this time on the Hungarian section, count amongst the worst ever ecological disasters in Europe. According to measurements, ca. 105–110 tons of cyanide were released into the Someş (Szamos) and Tisza, and all living organisms were affected as a result; the estimated amount of fishstock lost reached 1,241 tons on the Hungarian sections of the two rivers.

A chronic conflict has remained outstanding for twenty years between Hungary and Slovakia, over the issue of the hydroelectric power plant built at Gabčíkovo (Bős), and the cancellation of Hungary's participation in the project at Nagymaros (Danube Bend). The operation of the Slovakian nuclear power plant at Mochovce (Mohi), and illegal waste transportation and dumping has aroused further concern. Other issues include the illegal disposal of hazardous waste originating from Germany in the Kiskunság National Park, pollution of the River Rába (Raab) from Austria, the planning of a waste incinerator by an Austrian corporation near the Hungarian border at Heiligenkreuz (Rábakeresztúr) in Burgenland, and the opening of a gold mine in Roşia Montană (Verespatak) in Transylvania. The problems of environmental protection are further exacerbated by the large number of domestic issues, the solution of which is mainly the responsibility of the regional environmental authorities and local government.

At present Hungarian ***environmental policy*** is based on the Environmental Act of 1995 and the 2nd National Environmental Programme (NEP) for the period 2003–2008, along with the 3rd NEP (2009–2014) to be adopted by the Parliament by the end 2009. The present political agenda is dominated by budgetary consolidation, short-term crisis management and economic convergence with the EU. The Hungarian National Sustainable Development Strategy, adopted by the Government in 2007, provides a long term vision for 2050. In 2008, two important institutions were established by Parliament to enhance the concept of sustainable development and environmental democracy: the National Sustainable Development Council and the Parliamentary Commissioner for Future Generations (acting as ombudsman).

POPULATION AND SETTLEMENT

Demographic Features

Size and Distribution of the Population

On 1 January 2009, Hungary's population was estimated at 10,030,975, and accordingly Hungary was ranked 15th most populous among the countries of Europe and 83rd in the world. Following the Ottoman occupation until the 1970s, the population on the present-day territory doubled every century (*Table 8*). During the 18th century, along with the post-war natural increase in the population, a massive influx of foreign ethnic groups (e.g. Germans) were the main impetus, while in the 19th century it was industrialisation, with its positive impact on the local agriculture that resulted in a dynamic increase in the population number. Due to economic growth, improved living conditions, improvements in public health, and a continuous decline in the mortality rate, the annual population increase reached 1.2% between 1880 and 1905.

Excluding during periods of war during the 20th century, the population grew steadily until it reached its maximum in 1980 (10.7 million). Since then however, due to unfavourable shifts having taken place in natural change and age composition, there has been a demographic decline. The rate of this decrease could only be mitigated by a positive balance in international migration. The annual population loss of the country has been around 10–20 thousand since 1990.

During the last two decades, the population growth of settlements was mostly influenced by internal migration, as part of a process of suburbanisation.

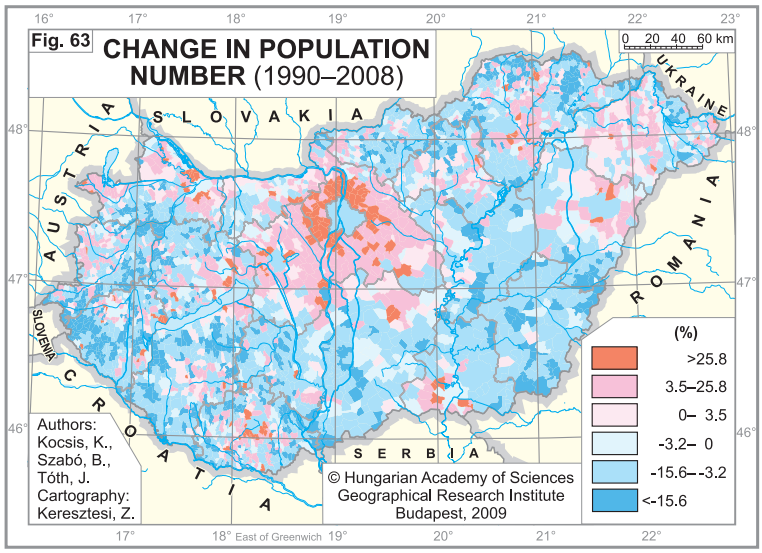
Consequently, the population increase has been especially striking in Central Hungary (the broadest zone of migration from Budapest) and in the agglomerations and suburban zones of the biggest cities (e.g. Miskolc, Debrecen, Szeged, Pécs, Győr and Nyíregyháza), parallel with the continuing population decline of the cities mentioned above (*Figure 63*).

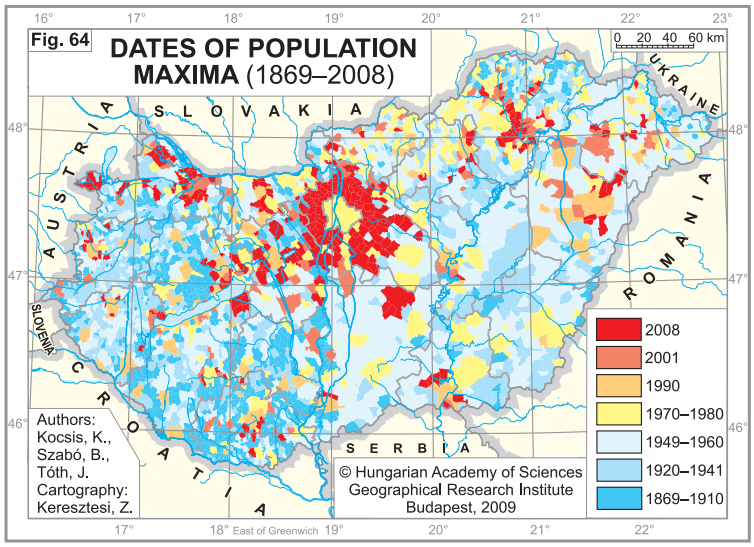
Besides these areas, the economically attractive urban centres along the Austrian border (e.g. Sopron and Mosonmagyaróvár) and certain rural areas inhabited partly by the Roma population (e.g. in Szabolcs, Cserehát and Baranya), showed favourable demographic

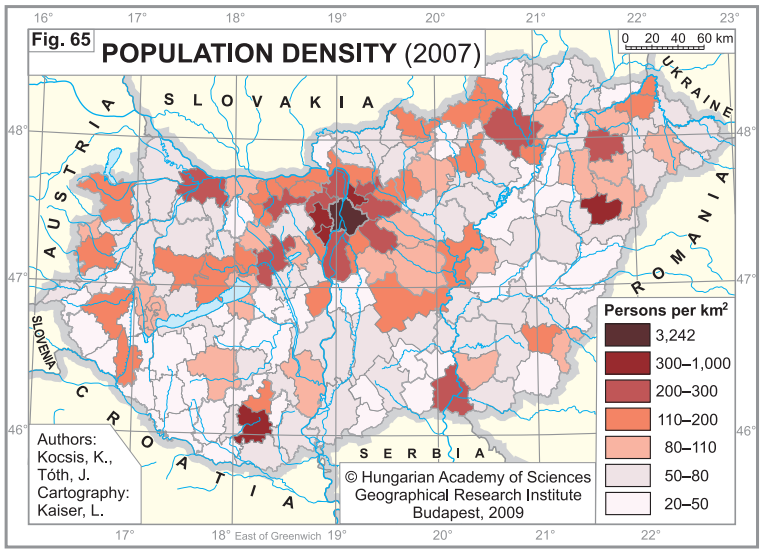
Table 8. ***Population growth and population density (1495–2009)***

Year	Population		Period	Population increase/ decrease		
	number	density (persons per km²)		actual period		per annum
				total	percentage	
1495*	1,032,000	11.1	..	..	..	..
1715*	1,480,000	15.9	1495–1715	448,000	43.4	0.19
1787*	2,681,595	28.8	1715–1787	1,201,595	81.2	1.13
1828*	3,578,666	38.5	1787–1828	897,071	33.5	0.82
1869	5,011,310	53.9	1828–1869	1,432,644	40.0	0.98
1880	5,329,191	57.3	1869–1880	317,881	6.3	0.56
1890	6,009,351	64.6	1880–1890	680,160	12.8	1.21
1900	6,854,415	73.7	1890–1900	794,392	13.2	1.25
1910	7,612,114	81.8	1900–1910	757,699	11.1	1.05
1920	7,986,875	85.9	1910–1920	374,761	4.9	0.48
1930	8,685,109	93.4	1920–1930	698,234	8.7	0.84
1941	9,316,074	100.1	1930–1941	630,965	7.3	0.70
1949	9,204,799	98.9	1941–1949	-111,275	–1.2	–0.15
1960	9,961,044	107.1	1949–1960	756,245	8.2	0.72
1970	10,322,099	111.0	1960–1970	361,055	3.6	0.36
1980	10,709,463	115.1	1970–1980	387,364	3.8	0.37
1990	10,374,823	111.5	1980–1990	-334,640	–3.1	–0.32
2001	10,198,315	109.6	1990–2001	-176,508	–1.7	–0.15
2009	10,030,975	107.8	2001–2009	-167,340	–1.6	–0.20

Remark: Data are calculated for the present-day territory of Hungary.
Source: *Calculations of Kocsis, K. (2009), Hungarian Central Statistical Office (www.ksh.hu)







indicators and were also able to increase their population. Similar spatial patterns are reflected by *Figure 64*, which indicates the dates of population maxima of Hungarian settlements during the last 140 years.

Accordingly, the population decline began prior to World War I in the small villages located in the hilly areas of South Transdanubia, and in the Bakony Mountains. Later, in the interwar period, underdeveloped agricultural regions were added to these areas including some villages of West Transdanubia and the Alföld. As a result of the economic and settlement policies of the socialist period, and the ensuing extensive industrialisation, the majority of the villages east of the Danube reached their population maxima early on, whereas the towns and industrial centres did so in the later stages (according to census data of 1949, 1960, 1970 and 1980). The aforementioned large settlements affected by suburbanisation are reaching their population peaks in the present day.

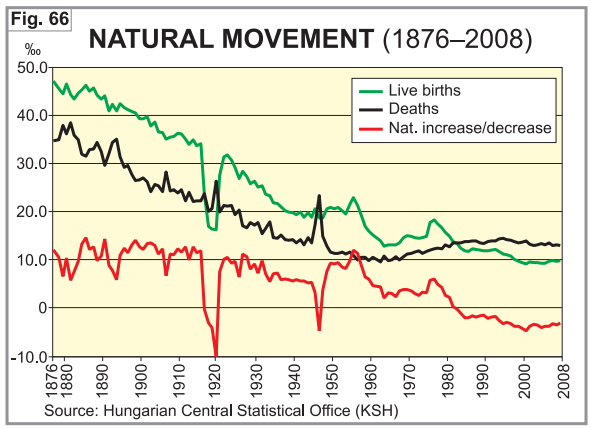
Population density in Hungary is 108 people per km², which is similar to France. There are substantial differences in the geographic distribution of the population as a result of the varied physical and human geographic environment (e.g. relief, settlement structure, economy, natural change and migration of the population). Due to the population concentration that has taken place in the industrialised and suburbanised zones over the last decades, high densities can be observed in the metropolitan area of Budapest and in the surroundings of the biggest cities (*Figure 65*). The most sparsely populated, underdeveloped areas with unfavourable economic and demographic indicators are to be found in South-West Transdanubia, on the Danube–Tisza Interfluve and in Central Tiszántúl. The changes in population density during recent periods show ongoing polarisation, i.e. a population decrease in the microregions with a low rate of population density, and ongoing spatial concentration of the population elsewhere.

Natural Population Movement

During the 20th century up until the 1970s, the annual number of ***marriages*** per 1000 inhabitants fluctuated around 9. Since then, due to the changed demographic behaviour of the younger generations, the trend for the postponement of marriages and the increasing caution against marital partnerships, it had dropped to 4 by 2008. In the 1970s, number of ***divorces*** stabilised at a high level, which contributed to the weakening stability of marriages. The lowest rates of divorce (1.9–2‰) are characteristic of the counties where the proportion of the population that declares itself as religious is the highest: the counties of Szabolcs-Szatmár-Bereg and Vas, where 87–89% of the population declared religious affiliation at the census of 2001.

By the end of the 18th century the ***natural population change*** in Hungary was characterised by equally high birth and death rates (around 50‰ and 40–45‰, respectively). During the period of dynamic industrial development in the second half of the 19th century, following improvements in public health, effective measures against epidemics (with respect to births) had led to a rapid and enduring decrease in the mortality rate, and a significant natural increase (up to 10–12‰ per annum) (*Figure 66, Table 9*). Owing to the catastrophic consequences of World War I (resulting in partitioning and the economic collapse of Hungary), the ensuing impoverishment of the masses, and resultant unhealthy housing conditions, natality declined at a faster rate than mortality during the interwar period and the natural increase showed a marked downward trend (to 6‰ per annum by the end of the 1930s). Following the serious losses of World War II, the natural increase again reached the annual 10‰ level due to the typical post-war 'baby boom'. In the second half of the 20th century, birth rates displayed great fluctuation, despite measures taken by the socialist government to halt these unfavourable demographic tendencies (in 1952, 1967 and 1973: e.g. abortion laws, child-care grants and increased family allowances). The continuous decrease in the birth rate has been largely attributed to the fundamental changes in the social and economic structure from the early 1950s onward, the disintegration of rural communities, massive internal migration and commuting, and an increasing participation in the workforce of female labour. Even though infant mortality diminished, the crude death rate started to increase from the mid-1960s, reflecting increased mortality among males provoked by a lifestyle injurious to health and an excess of work. As a combined effect of these negative fertility and mortality trends, a natural population increase turned into continuous natural decrease since 1981.

Fig. 66



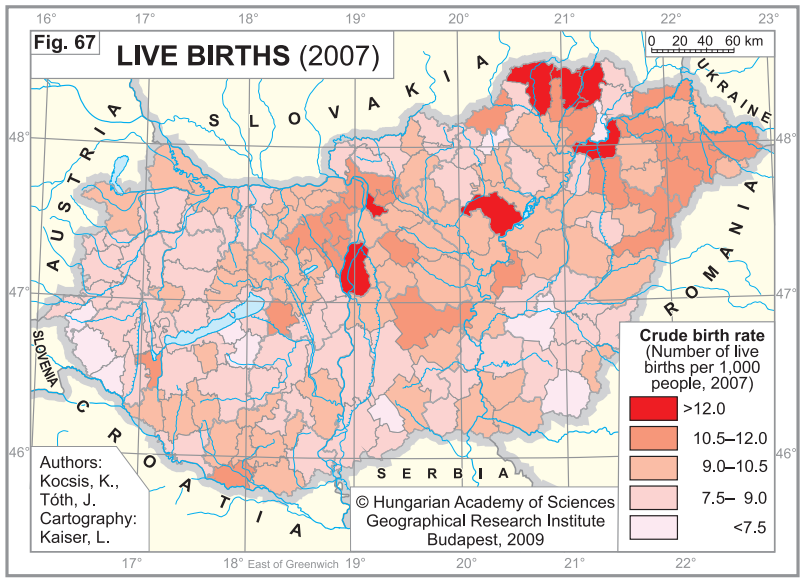
At present the live birth ratio is fluctuating slightly below 10‰, whilst the crude death rate is around 13‰. The low level of fertility is partly related to a continuously increasing ratio of infants born out of wedlock (1980: 7%; 2000: 29%; 2008: 39.5% extramarital live births out of the total). Data shows substantial spatial differences according to the level of regional economic, social and cultural development, along with the age structure and religious convictions of the local population.

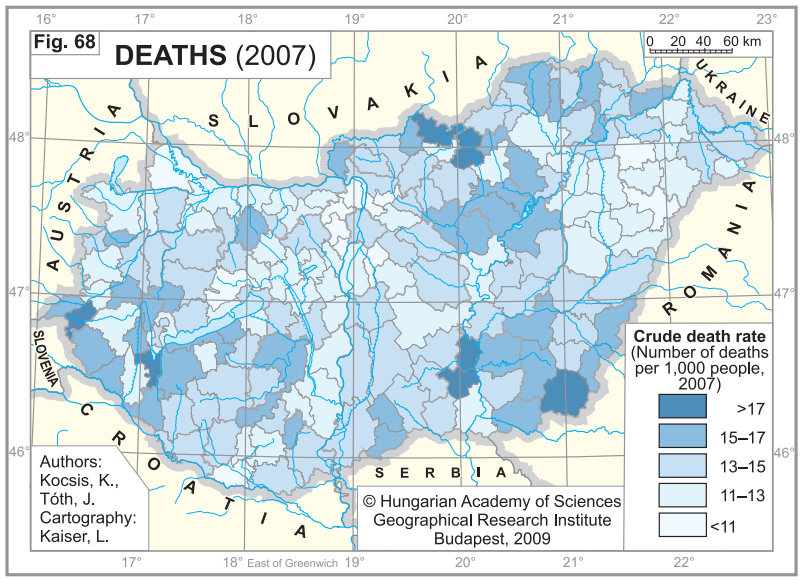
The crude ***birth rate*** is the highest in the more dynamic areas (e.g. the Budapest Metropolitan Region /BMR/, that attract larger numbers of (mainly younger) migrants, and certain microregions in North-East Hungary inhabited by a traditionally fertile and religious population (e.g. Szabolcs). Further, the areas with a significant Roma population are characterised by high fertility and juvenile age structures (e.g. Abaúj, Szabolcs and Szatmár in the north-east; the Middle Tisza region; and certain microregions of Baranya and Somogy in Transdanubia) (*Figure 67*). The less dynamic areas are the mainly underdeveloped, rural and generally disadvantaged ones, very often in border zones.

Table 9. ***Selected demographic indicators (1900–2008)***

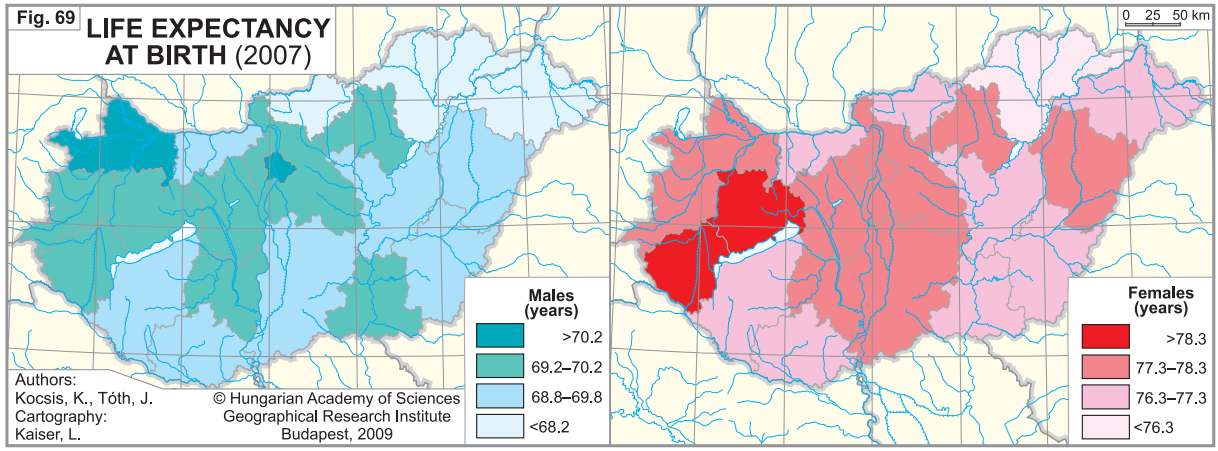
Year	Live births	Deaths	Infant mortality*	Natural increase / decrease	Registered			Number of females per 1,000 males	Ratio of population		Ageing index	Mean age	Life expectancy at birth	
					marriages	divorces	abortions		aged 0–14	aged 65 and over			males	females
	per 1,000 inhabitants						per 1,000 live births		in %			in years		
1900	39.7	26.3	225.7	13.4	9.1	0.2	..	1,005	34.9	4.4	12.7	26.9	36.56	38.15
1910	35.1	22.3	196.1	12.8	8.6	0.4	..	1,007	34.8	5.0	14.4	27.3	39.07	40.48
1920	31.4	21.3	192.5	10.1	13.1	0.8	..	1,062	30.6	5.6	18.2	28.9	41.04	43.12
1930	25.4	15.5	152.5	9.9	9.0	0.6	..	1,044	27.5	6.3	23.0	30.2	48.70	51.80
1941	18.9	13.2	115.6	5.7	8.5	0.5	..	1,043	26.0	7.0	26.9	32.1	54.95	58.24
1949	20.6	11.4	91.0	9.2	11.7	1.4	8.5	1,081	24.9	7.5	30.3	33.3	59.28	63.40
1960	14.7	10.2	47.6	4.5	8.9	1.7	1,107.2	1,073	25.4	8.9	35.2	34.8	65.89	70.10
1970	14.7	11.6	35.9	3.1	9.3	2.2	1,266.5	1,063	21.1	11.5	54.4	37.0	66.31	72.08
1980	13.9	13.6	23.2	0.3	7.5	2.6	544.0	1,064	21.9	13.5	61.9	37.7	65.45	72.70
1990	12.1	14.0	14.8	-1.9	6.4	2.4	859.3	1,081	20.5	13.2	64.5	39.0	65.13	73.71
2001	9.5	13.0	8.1	-3.4	4.3	2.4	743.4	1,103	16.6	15.1	91.3	41.1	68.15	76.46
2002	9.5	13.1	7.2	-3.5	4.5	2.5	749.8	1,104	16.3	15.3	93.5	41.3	68.26	76.56
2003	9.3	13.4	7.3	-4.1	4.5	2.5	740.7	1,105	16.1	15.4	95.4	41.6	68.29	76.53
2004	9.4	13.1	6.6	-3.7	4.3	2.4	724.2	1,106	15.9	15.5	97.6	41.8	68.59	76.91
2005	9.7	13.5	6.2	-3.8	4.4	2.5	673.9	1,107	15.6	15.6	99.9	42.0	68.56	76.93
2006	9.9	13.1	5.7	-3.2	4.4	2.5	637.8	1,106	15.4	15.8	102.4	42.2	69.03	77.35
2007	9.7	13.2	5.9	-3.5	4.1	2.5	449.4	1,106	15.2	15.9	104.9	42.4	69.19	77.34
2008	9.9	13.0	5.6	-3.1	4.0	2.5	446.6	1,106	15.0	16.2	107.6	42.6	..	..

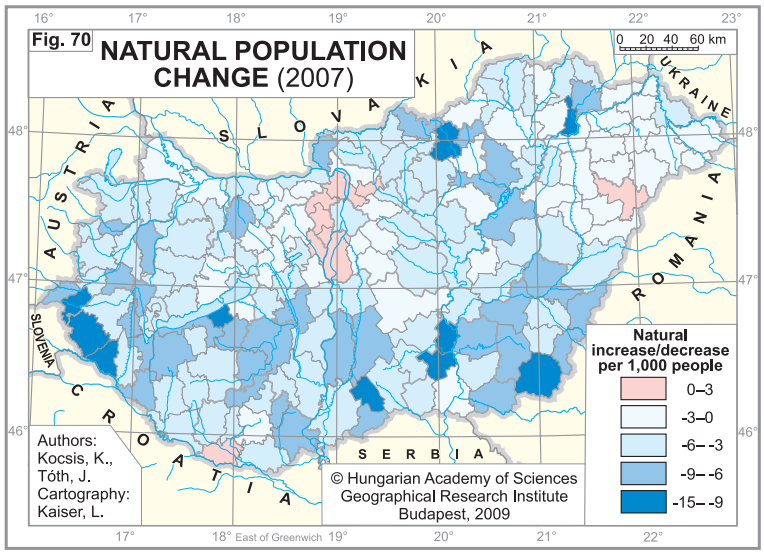
Remark: * Number of deaths of infants (one year of age or younger) per 1,000 live births.
Source: Hungarian Central Statistical Office (www.ksh.hu)





The ***mortality*** rate is an indicator of the state of health, living standards, the age and gender structure of the local population and its geographical differences mainly reflect social inequalities. The crude death rate is especially high in rural areas characterised by a lower quality of life, relative lack of development, a lower ratio of juvenile Roma population compared to the elderly (e.g. in northern, south-eastern and south-western marginal/border regions of the country) (*Figure 68*). Due to the latter, mortality is also significant in areas popular with elderly migrants (e.g. certain districts of the Balaton region). There is interdependence between the level of economic development and ***life expectancy*** at birth, which is a key indicator of mortality. Over the last century its value almost doubled in Hungary, and in 2007 surpassed 77 years for females, and 69 years for males. During this period the difference of life expectancy between the genders increased from 1.5 to more than 8 years. Life expectancy at birth is the longest in the economically more developed regions (Central Hungary and North Transdanubia). The spatial differentiation is greater in the case of males: dwellers of





Budapest or Győr-Moson-Sopron County might live 3–4 years longer than people living in the north-eastern regions of the country (*Figure 69*).

Among the 174 microregions of the country, there are only 10 where the birth rate surpasses the mortality rate, i.e. where a ***natural increase*** is experienced. The majority of them are to be found in the agglomeration of Budapest (*Figure 70*). The high rate of population decrease is a result primarily of large-scale mortality in underdeveloped, marginal regions of the country.

Migration

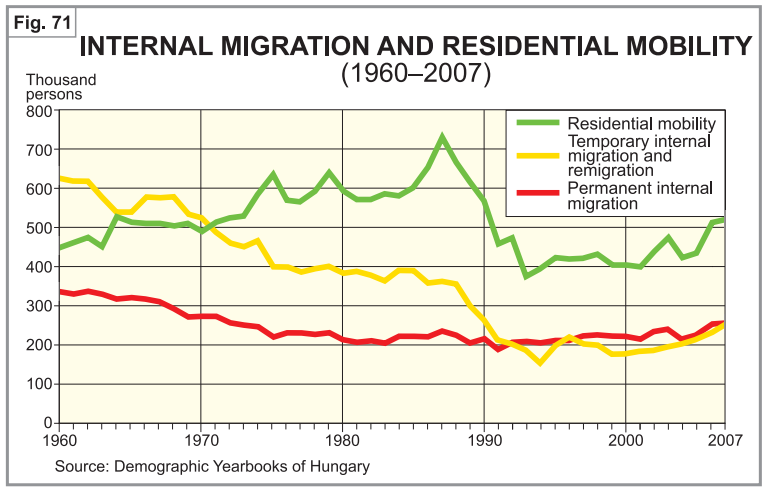
In the first part of the 20th century, the level of ***domestic migratory movement*** was low, although this changed significantly in several aspects between 1940 and 2008. With respect to the *volume* of migration, there were massive waves of flow until the mid-1960s. During this period the previous demographic tensions eased, and people were given an opportunity to leave overpopulated areas (mainly the Alföld). The main destinations were Budapest and its agglomeration, regions with heavy industry and mining areas. The extremely rapid relocation of workplaces had become the key driving force of migration in this period.

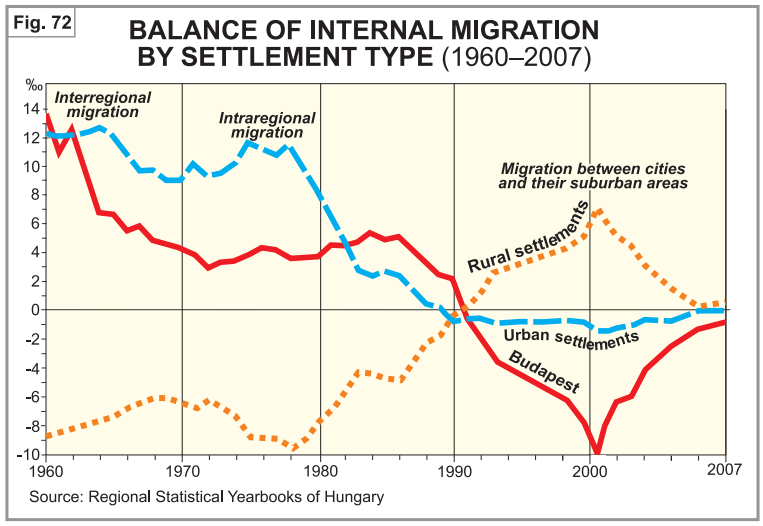
By the mid-1960s the majority of the population had found its 'home' as it were, which is clearly shown by the decrease in the number of migrants, and in the intensity of migration. Starting with the early 1970s migration distances also shortened simultaneously; long distance interregional movements were gradually replaced by intraregional (intra-county) migration. At the same time the number of moves within settlements gained momentum.

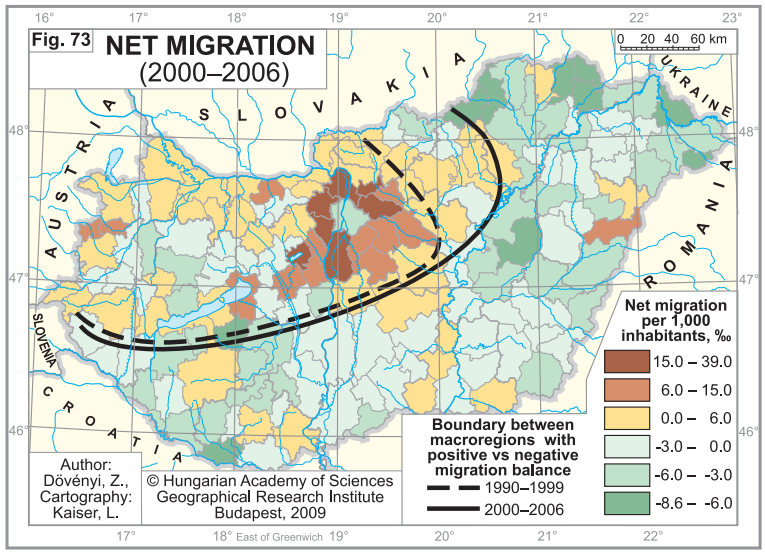
After the regime change, domestic migratory movements did not evolve in the expected manner and the migratory behaviour of the population in fact moved contrary to the anticipated trend. As an example, several tendencies from the 1980s continued as if nothing had happened, mainly with respect to movement volumes and intensity, in respect of which a change has only occurred since 2004 (*Figure 71*).

Since around 1990, the direction of migrants has changed significantly. Previously, migration reinforced population concentration, but this trend has been replaced by de-concentration; thus previous moves targeted at the large urban settlements have been replaced by emigration from the cities. This new migration type, called 'suburbanisation', has become a new qualitative and decisive factor in domestic migration. Although the direction of migration has altered, the volumes and intensities have hardly changed. Suburbanisation has made a spectacular appearance in the BMR, but it has become visible around the larger cities, middle-sized towns, and even in the surroundings of some small towns. According to migration balance statistics, the biggest losses to suburbanisation have been suffered by the City of Budapest; the winners are villages, whereas others cities have thus far managed to emerge by only showing a slight population loss (*Figure 72*).

However, based on latest data, it appears that the period of extreme suburbanisation rates has come to an end, the country is likely to enter a new phase in which migration has became







balanced: when viewed either from Budapest, other cities or villages, present migration nets out at zero, and it is an intriguing question for the forthcoming years as to which way changes may alter this. Besides suburbanisation, desurbanisation is also a characteristic of domestic migration, as is the 'suburbanisation of the poor', that can be summarised as the escape of the lower societal classes from big cities. The migration of these groups occupies its own niche next to classic suburbanisation, as in some cases rural spaces outside the suburban belts are the target areas.

The areas realising migration gains versus those reporting losses are increasingly separated spatially. Among the former are the great winners of suburbanisation, e.g. the areas around the capital, and the border regions adjacent to Austria. These days the north-eastern part of the country is the typical source of migrants. Based on the migration balance of the statistical microregions, a spatial migration-line can be identified, that separates the macro-areas of immigration and emigration within the country (*Figure 73*).

Labour force movement can be seen as a special type of migration. Commuting became a mass phenomenon in Hungary during the socialist era, with the number and proportion of commuters steadily increasing until 1980. Following this period, the number of commuters decreased due to a drop of people engaged in employment, and again after 1990, as a result of mass unemployment.

The trough was reached in 1996, after which it started to increase again. In contrast to the fluctuations in the sheer number of commuters, the proportion amongst the active workers has been steadily increasing.

There are several factors behind this phenomenon (*Table 10*):

– The mobility of the workforce increased following the regime change;

– There was a rearrangement in the spatial structure of workplaces following 1989;

Table 10. ***Selected indicators for labour force movement (1980–2005)***

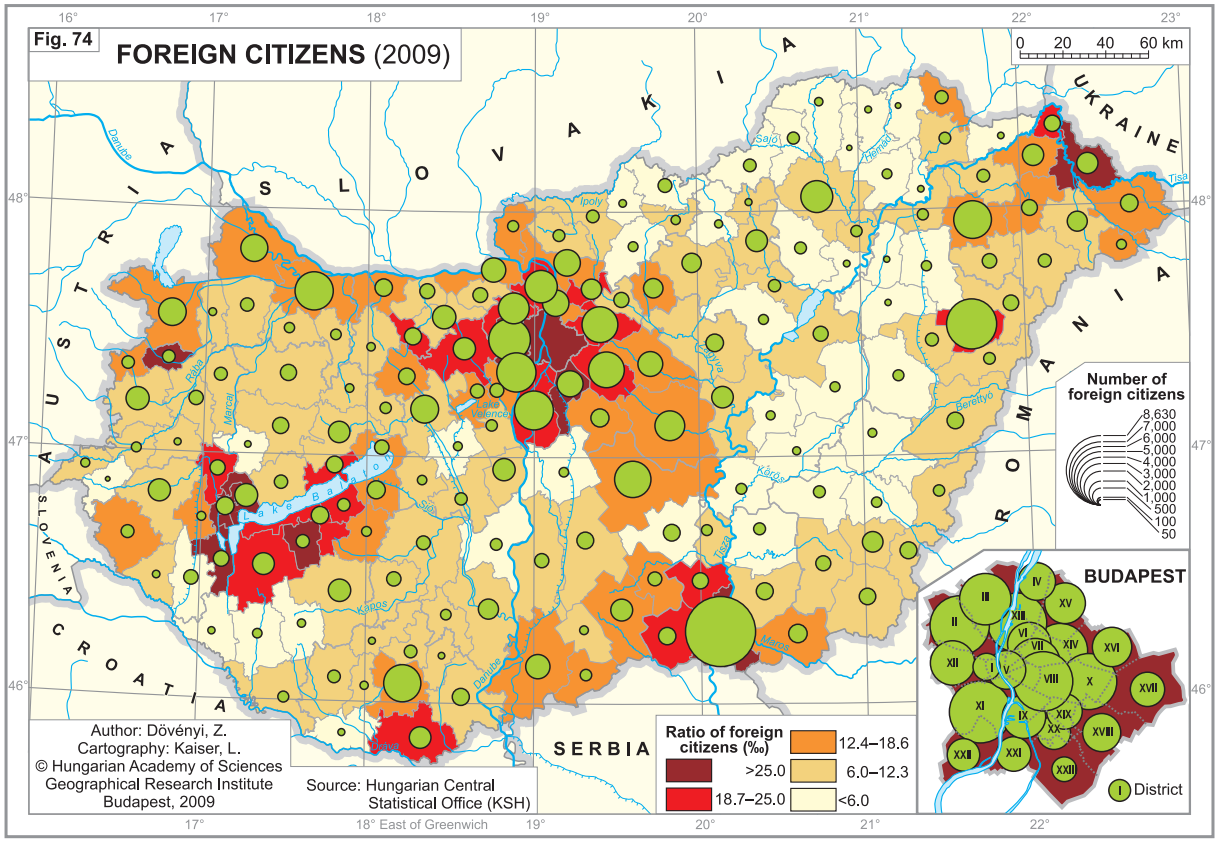
Indicators	1980	1990	1996	2001	2005
Number of daily commuters	1,217,139	1,144,756	886,746	1,102,005	1,211,324
Males	828,745	744,099	574,764	693,235	757,961
Females	388,394	400,657	311,982	408,770	463,363
Structure of daily commuters (%)	100.0	100.0	100.0	100.0	100.0
Males	68.1	65.0	64.8	62.9	62.1
Females	31.9	35.0	35.2	37.1	37.9
Ratio of daily commuters amongst employees (%)	24.0	25.3	25.4	29.9	31.8
Males	28.9	29.6	29.7	34.6	36.5
Females	17.7	19.9	20.2	24.2	26.2

Source: 2001 Census. 7. Data on employment and daily commuting. Budapest, 2003, 2005 Microcensus. 3. Situation of employees. Budapest, 2006.

– As a result of suburbanisation, many employees have changed their place of residence, but their workplaces have remained the same.

Substantial structural changes also took place in the spatial movements of the labour force. Among them is the steadily increasing ratio of women among commuters. The spatial structure of commuting has changed in a sense that whilst the capital and other large cities have maintained their prominent role as magnets for labour (and thus for commuters), the intensity of movement in the workforce decreased significantly in areas where heavy industry and mining have been in decline.

During the 20th century the direction of ***international migration waves*** changed several times, so that Hungary has oscillated between being a recipient and a source country. After the regime change, Hungary once again became a target country. The first sign of this change was the ***wave of refugees*** from 1987 onwards. In the beginning, immigrants from Romania (mainly Transylvania) applied for asylum, and later, refugees fleeing the Yugoslavian civil war arrived. After 1997 a new period began when people seeking asylum arrived in growing numbers from distant corners of the world (e.g. Afghanistan and Bangladesh). The most intensive phase of this wave ended in 2001, when the



number of people arriving and seeking asylum was only about one thousand per year.

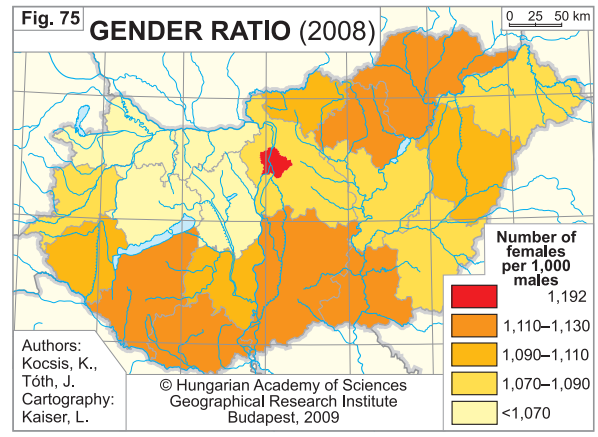
In the frame of international migration, ***voluntary immigration*** has increased enormously: between 1985 and 2007, some 460 thousand immigrants legally arrived in Hungary. However, Hungary overwhelmingly remains a target country for immigration from ethnic Hungarians living in certain neighbouring countries; 60–70% of all immigrants arrived from Romania, Ukraine and former Yugoslavia (mainly from Serbia).

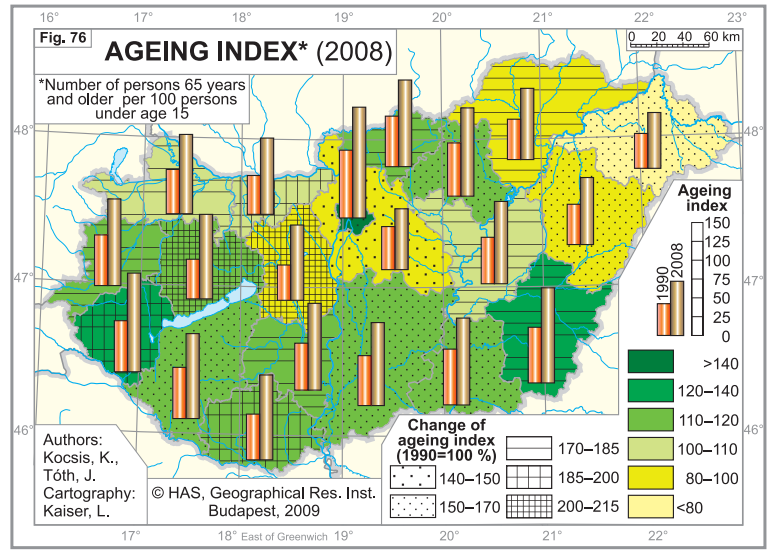
The number of foreigners living in Hungary has been steadily increasing: at the beginning of 2008, the number of foreign citizens legally residing in Hungary was almost 175 thousand. More than 80% of them came from European countries and over 60% from the neighbouring states.

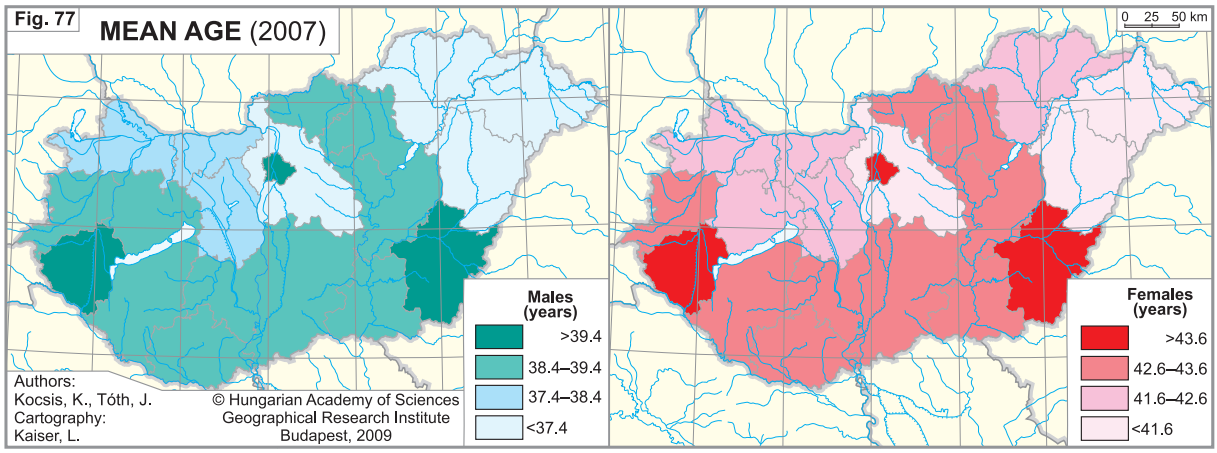
The ratio of foreign citizens legally resident, relative to the total population is not high (2009: 1.86%), but they are strongly concentrated in the capital and its environs where approximately half the foreigners choose to live, and their proportion is higher than average in micro-regions next to the Serbian and Ukrainian borders and around the Lake Balaton (*Figure 74*).

Structure of the Population by Gender and Age

The gender and age structure of the population as a demographic phenomenon impacts upon the reproductive and labour potential of society. Following large losses amongst the male population during the wars, the almost perfectly balanced ***gender ratio*** (number of women per one thousand men) of the early 20th century became significantly distorted during the period 1900–1949 (1900: 1,005; 1949: 1,081). Due to the post-war 'baby boom', the pro-natal measures of government and significant differences in fertility between the two sexes (male surplus at birth) the gender ratio became more balanced during the early socialist period (1970: 1,063 females/1,000 males). The figures began to demonstrate an accelerated distortion of the gender ratio in the late 1970s due to the increase in mortality, decrease in fertility and the gradual ageing of the population (1990: 1,081; 2008: 1,106). As a consequence, in Hungary today there are around half a million more females than males. The most balanced gender ratio is typical of the highly developed counties of North Transdanubia and Pest, the demographic situations of which are the most favourable (*Figure 75*), whilst it is the most distorted in the capital, also notable for having the highest rate of ageing.







Ageing of the population and the increase in the ratio of elderly people is the most significant demographic phenomena in Hungary. During the period 1900–2008, the proportion of children (persons aged 0–14 years) decreased from 34.9% to 15%. At the same time the ratio of elderly people (persons of 65 years and over) increased from 4.4% to 16.2%. Due to a general ageing of the population, the considerable increase in the death rate of working-age people (mainly amongst men) and the decrease in fertility, the *ageing index* in Hungary (number of elderly people per 100 children) increased between 1990 and 2008 from 64.5 to 107.7. There is a lesser degree of distortion in the age structure in the north-eastern areas (primarily in Szabolcs), in Pest County and in certain regions of North Transdanubia, due to their aforementioned favourable demographic, economic and also ethnic (Roma) attributes (*Figure 76*). During most of the last two decades, there has been an increase in the rate of ageing in counties with relatively favourable demographic indicators (e.g. Fejér and Borsod-Abaúj-Zemplén), tending towards spatial equalisation. The *mean age* of the population is also an indicator of trends in ageing, the value of which increased from 1900 to 2009, from 26.9 to 42.6 years. Geographic differences exhibit the same patterns mentioned above: a younger age structure in regions characterised by high fertility and low mortality (*Figure 77*).

Structure of the Population by Economic Activity

In the first half of the 20th century Hungary remained a predominantly agricultural country and the proportion of those employed in farming was over 50%, even by 1949. Although the number of agricultural earners decreased steadily due to socio-economic changes during the socialist period, a significant need for manpower on the large farms remained, thus it was still 15.5% in 1990. Agriculture suffered a heavy toll as a result of the regime change and the number of the people occupied by its workforce dropped sharply, down to a mere 5.5% in 2001. Numbers of industrial workers changed relatively little, since the sector did not become disproportionately oversized during the period of accelerated industrial development that was encouraged by the socialists. The proportion of its workers peaked in 1980 (36.8%), and the importance of the sector remained relatively high, even against the fundamental transition that industry underwent following the regime change (2001: 26.5% plus 6.4% employed in construction). The tertiary sector has been the real winner of employment realignment, but this took place only after the regime change, when employment in this sector increased significantly (1990: 46.6%; 2001: 61.6%).

Transitional changes in ***employment*** were already tangible before the regime change, mainly from the decrease in the number of employed people. Although this did not pose a real prob-

lem at that time, difficulties emerged following 1990 when nearly one and a half million jobs were liquidated within a few years, leading to a strong fall in the employment rate and economic activity in general. Furthermore, such changes have also proven to be enduring: currently the economically activity proportion of the Hungarian population is much lower than that typical of developed nations. The employment rate of working age people (i.e. between 15–64 years) is some ten percent lower in Hungary (ca 57%) than that of the EU-average. The employment rate of people between 15–74 years is on average only slightly higher than 50%, but in areas of the country struggling with economic difficulties it barely reaches 40% (*Figure 78*).

Among the negative social and economic developments related to the change of regime, unemployment is of significant importance, as the most typical change in the labour market. The unemployment rate has demonstrated a distinct trend: the country's economy sank into a deep crisis post-1989 that reached its trough in 1993. An improvement followed until 2002, after which a slow rise of unemployment returned, that has accelerated since the autumn of 2008 due to the world economic crisis. Consequently in March of 2009, the rate of unemployment in accordance with the EU-member state definition was over 9%, which is unprecedented for 15 years (*Figure 79*).

A specific feature of unemployment is that there have been relatively few clusters of people that are not employed, e.g. female employment has for a long time been lower than male employment, and its equalisation has only begun in recent years. The different age groups are represented almost equally amongst the jobless, so particular concentrations of unemployed school leavers or the elderly are not typical. With respect to the level of education, the dominance of those without a high school education or those that graduated from industrial vocational schools, is tangible and they make up approximately 70% of the unemployed.

A serious problem for the Hungarian unemployment arena is the significant proportion of the jobless that does not have a real chance of returning to the legal labour market. Long-term unemployment increasingly forces the unemployed to earn a living occupied in the black economy or to subsist from social benefits. Many in the Roma community of an active working age fall into this category.

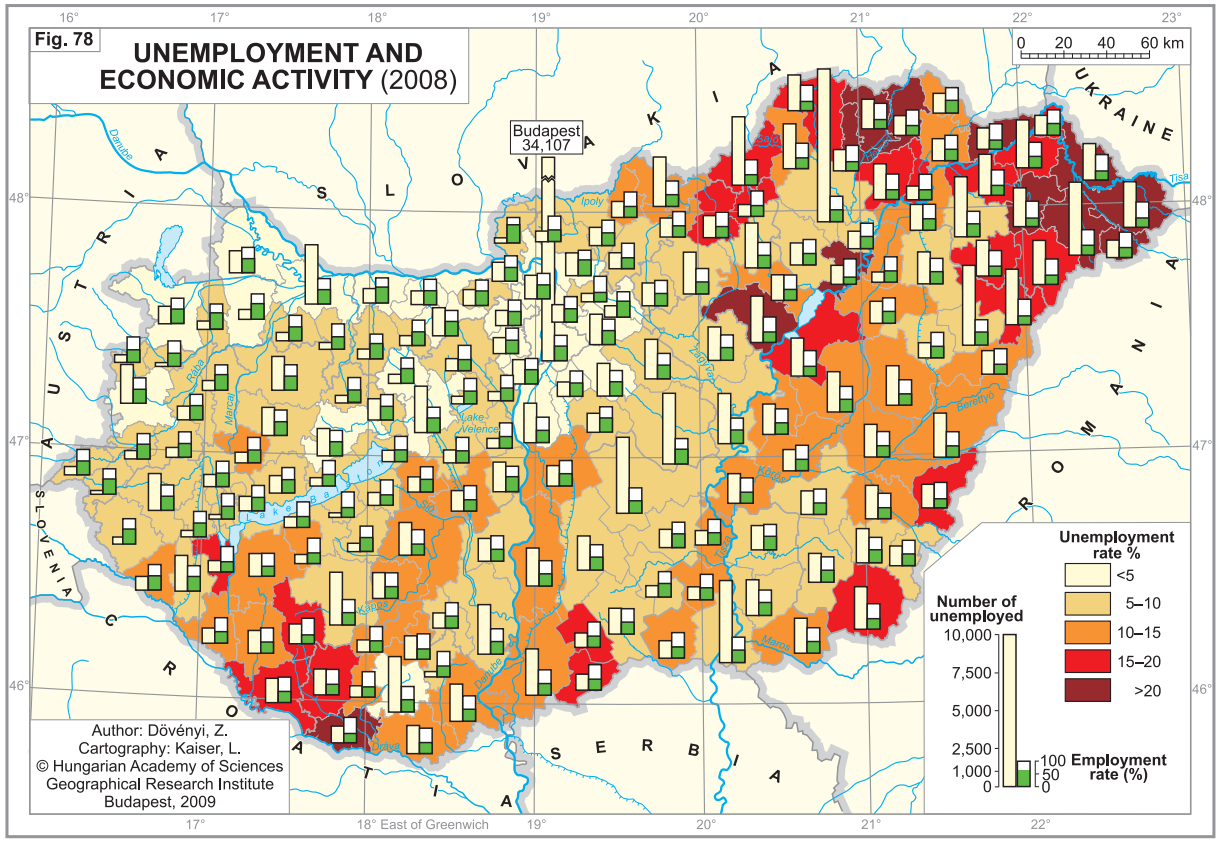
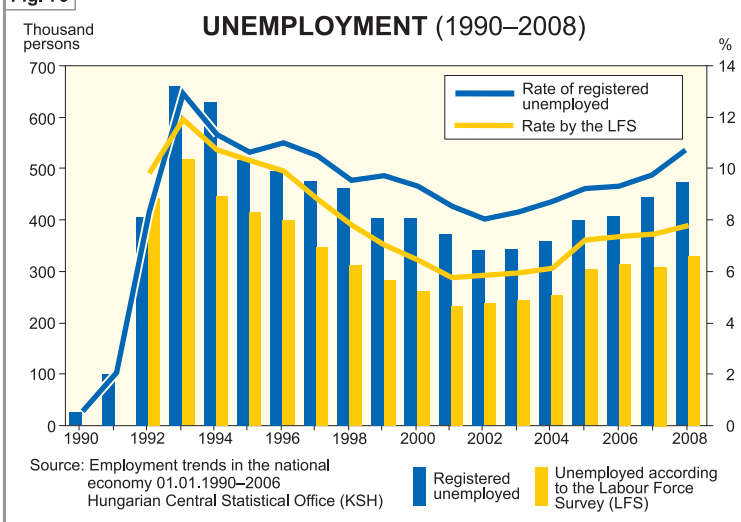


Fig. 79



Source: Employment trends in the national economy 01.01.1990–2006 Hungarian Central Statistical Office (KSH)

In contrast to the structural characteristics, the spatial disparities in unemployment are pretty stable, and they are good indicators of the economic potential of a certain region, and of its adaptability to the economic crisis. Accordingly, the proportion of the unemployed is permanently low in the capital and BMR, as is the broader border zone adjacent to Austria. At the same time unemployment is much higher than average in the north-eastern part of the country, and also in South Transdanubia, especially in the border regions (*Figure 78*).

Ethnicity and Religion

Ethnic-Lingual Patterns

As a result of the Treaty of Trianon (1920), Hungary lost 71.4% of its territory and 33% of its ethnic Hungarian population. The country thus turned into one of the ethnically most homogenous states on the continent, whilst the Hungarians (Magyars) became one of the most divided ethnicities (*Figure 2*). From 1920 onwards, Hungarians lived across initially five, then from 1991, eight different countries: Hungary, Slovakia (from 1993), Ukraine (Transcarpathia), Romania (Transylvania), Serbia (Vojvodina), Croatia, Slovenia (Prekmurje region) and Austria (Burgenland). In the period after 1920, these Hungarians went from being in the majority to becoming a minority – for the first time in history – thus becoming a target for anti-Hungarian vengeance in neighbouring states. Their settlement areas became massively colonised and militarised (mostly frontier) zones of neighbouring countries.

During the 20th century, the proportion of the population with a non-Hungarian mother tongue decreased from 10.4% to 1.1%, for the most part as a result of migration in the years 1919–23, 1938–41 and 1944–47, following border changes, and through the assimilation of the autochthonous minorities. At the same time both the number of ethnic Hungarians and their ra-

Table 11. ***Hungarians in the regions of the Carpatho-Pannonian Area (1910–2001)***

Year	Carpatho-Pannonian Area	HUNGARY (H)	Transylvania (RO)	SLOVAKIA (SK)	Vojvodina (SRB)	Transcarpathia (UA)	Pannonian Croatia (HR)	Prekmurje (SLO)	Burgenland (A)
	Number of Hungarians in thousands								
1910	10,036.2	*6,730.3*	*1,653.9*	*880.9*	*425.9*	*184.3*	*114.0*	*20.7*	*26.2*
1920	9,710.5	*7,156.0*	1,305.8	650.6	*371.0*	111.1	*77.0*	*14.1*	*24.9*
1930	10,637.6	*8,000.3*	*1,476.2*	585.4	*376.2*	116.5	*65.0*	*7.6*	*10.4*
1941	11,946.2	*8,655.8*	1,735.7	761.4	*473.2*	*233.8*	*67.3*	*16.9*	*2.1*
1949	11,527.6	*9,076.0*	*1,481.9*	354.5	428.9	120.0	50.8	10.2	*5.3*
1960	12,565.5	*9,786.0*	*1,616.2*	518.8	442.6	146.2	40.8	9.9	*5.0*
1970	12,964.1	*10,166.2*	*1,625.7*	552.0	423.9	151.9	33.8	9.1	*1.5*
1980	13,403.3	*10,579.9*	1,691.0	559.8	*370.0*	*166.1*	23.8	8.6	*4.1*
1990	12,955.3	*10,222.5*	*1,619.7*	567.3	*344.7*	*166.7*	20.0	7.6	*6.8*
2001	12,016.2	*9,546.4*	*1,429.5*	*572.9*	*284.2*	*158.7*	*11.3*	*6.6*	*6.6*
2001	11,822.0	9,416.0	1,416.8	520.5	290.2	151.5	15.0	5.4	..
	Ratio of Hungarians in %								
1910	49.2	*88.4*	*31.6*	*30.2*	*28.1*	*30.8*	*3.5*	*22.9*	*9.0*
1920	46.7	*89.6*	25.5	22.0	*24.2*	18.1	*2.4*	*15.2*	*8.4*
1930	46.9	*92.1*	*26.7*	17.6	*23.2*	15.9	*1.8*	*8.4*	*3.5*
1941	49.0	*92.9*	29.5	21.5	*28.5*	*27.3*	*1.7*	*20.1*	*0.7*
1949	48.4	*98.6*	*25.7*	10.3	25.8	15.1	1.4	10.8	*1.9*
1960	47.6	*98.2*	*25.9*	12.4	23.9	15.9	1.0	11.0	*1.9*
1970	46.3	*98.5*	*24.2*	12.2	21.7	*14.4*	0.8	10.0	*0.5*
1980	44.8	*98.8*	22.5	11.2	*18.2*	*14.4*	0.6	9.3	*1.5*
1990	42.9	*98.5*	*21.0*	10.7	*17.1*	*13.4*	0.5	8.5	*2.5*
2001	40.8	*93.6*	*19.8*	*10.7*	*14.0*	*12.7*	*0.3*	*8.0*	*2.4*
2001	40.1	92.3	19.6	9.7	14.3	12.1	0.4	6.6	..

Remark: Italic figures represent data on mother tongue (native language), normal figures refer to those on ethnic affiliation. *Source:* Population censuses.

tio to locals in the detached territories decreased (*Table 11*). The non-Hungarian minorities had settled in the present-day territory of Hungary prior to the emergence of the modern concept of nations and thus experienced the process of nation-building, for the most part, as minorities within the Hungarian nation (e.g. Slovenes: 12–13th century; Roma, Serbs, Croats: 15–17th century; Germans/Swabians, Slovaks, Romanians, Rusyns: 17–19th century). A contributory factor to their assimilation was the fact that they found themselves amongst a highly dispersed diaspora and spoke Hungarian as their 'main language', rather than their national language, in addition to their dialects. In contrast, the annexed Hungarians in the Carpathian Basin became citizens of neighbouring states only in 1920 (and for a second time in 1945), by which time they possessed an already strong, centuries-old ethnic Hungarian consciousness.

According to the latest census data, of a total 13–14 million *Hungarians in the world* – a number similar to the population of Kazakhstan, a sizeable country – 90% lives in the Carpathian Basin, on the historical territory of Hungary *(Table 12).* There are nearly 3 million European Hungarians living outside the borders of present-day Hungary, forming one of the largest minorities in Europe, outnumbering the populations of 86 countries of the world (e.g. Mongolia, Latvia or Namibia). Out of those that declared their ethnicity as Hungarian, 9.4 million are inhabitants of Hungary, 1.4 million of Transylvania (in Romania), 520 thousand of Slovakia, 290 thousand of Vojvodina (in Serbia), 151 thousand of Transcarpathia (in Ukraine) and 15 thousand of the Pannonian region in Croatia.

Present-day ethnic patterns. At the time of the 2001 census, of the population of 10.2 million, 5.3 to 6.2% refused to respond to questions about their ethnic-lingual affiliation. Most of those people, who were apparently unmotivated about their ethnic status, i.e. 'denationalised' Hungarians or 'cautious and distrusting' ethnic minorities, lived in Budapest and its environs, and in other big cities. A total of 92.3% of the population professed Hungarian ethnicity and 93.6% declared themselves to be Hungarian native speakers (*Table 13*). The number of those who declared a Hungarian ethnic affiliation had dropped from 10.6 million in 1980, down to 9.4 million in 2001, owing to the weakening national identity and natural decrease recorded since 1981. Due to the change in their declared mother tongue and the natural assimilation of the younger members of ethnic minorities, the number of non-Hungarian native speakers decreased considerably (among the Germans and Croats) or stagnated (among the Roma) between 1990 and 2001. The largest minority group, by mother tongue (in thousands) were the Roma 48.7, Germans 33.8, Slovaks 11.8 and Croats 14.3. Over the same period as a result of the above, along with a revival in relations with the mother country, a high natural increase and growing ethnic consciousness among the Roma, the number of people who declared non-Hungarian ethnicity had risen from 233 thousand to 330 thousand.

As far as the lingual spatial pattern is concerned, the territory of the country is rather uniform (Hungarian), but by ethnic affiliation and origin – owing to the increasing number and ratio of the Roma (up to 90% Hungarian native speakers) – the population of north-eastern

Table 12. ***Hungarians in the World (1930, 2000)***

Regions	Around 1930	Around 2000
	In thousands	
Hungary	8,000.3	9,546.4
Carpatho-Pannonian Area (excluding Hungary)	2,637.3	2,469.8
Europe (excluding Carpatho-Pannonian Area)	205.0	270.0
North America	630.0	735.0
South America	50.0	55.0
Asia	2.7	230.0
Africa	3.0	10.0
Australia and Oceania	0.3	62.0
World total	**11,528.6**	**13,378.2**

Remark: Carpatho-Pannonian Area = Slovakia (SK), Transcarpathia (UA), Transylvania (RO), Vojvodina (SRB), Pannonian counties of Croatia (HR), Prekmurje (SLO) and Burgenland (A)
Source: 1930: Nagy, I.1935, Rónai, A. 1938; 2000: Carpatho-Pannonian Area: mother tongue data of the censuses (2001, 2002); other territories: www.hhrf.org/htmh/?menuid=060209

Table 13. ***Ethnic structure of the population on the present-day territory of Hungary (1880–2001)***

Ethnic groups	1880	1910	1941	1949	1990	2001	2001*
	Population number (thousand)						
Total population	**5,343.4**	**7,612.1**	**9,316.1**	**9,204.8**	**10,374.8**	**10,198.3**	**10,198.3**
Hungarians	4,402.4	6,730.3	8,655.8	9,076.0	10,222.5	9,546.4	9,416.0
Germans	606.4	553.2	475.5	22.5	37.5	33.8	62.2
Slovaks	199.8	165.3	75.9	26.0	12.7	11.8	17.7
Croats	59.3	62.0	37.9	20.4	17.6	14.3	15.6
Romanians	25.0	28.5	14.1	14.7	8.7	8.5	8.0
Serbs	18.8	26.2	5.4	5.2	3.0	3.4	3.8
Slovenes	4.6	6.9	4.8	4.5	2.6	3.2	3.0
Roma (Gypsies)	..	9.8	18.6	21.4	48.1	48.7	190.0
Other ethnic groups	27.1	29.9	28.1	14.1	22.1	28.4	29.7
Unknown	..	..	..	..	..	541.1	570.5
	in %						
Total population	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Hungarians	82.4	88.4	92.9	98.6	98.5	93.6	92.3
Germans	11.3	7.3	5.1	0.2	0.4	0.3	0.6
Slovaks	3.7	2.2	0.8	0.3	0.1	0.1	0.2
Croats	1.1	0.8	0.4	0.2	0.2	0.1	0.2
Romanians	0.5	0.4	0.2	0.2	0.1	0.1	0.1
Serbs	0.4	0.3	0.1	0.1	0.0	0.0	0.0
Slovenes	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Roma (Gypsies)	..	0.1	0.2	0.2	0.5	0.5	1.9
Other ethnic groups	0.5	0.4	0.2	0.2	0.2	0.3	0.3
Unknown	..	..	..	..	..	5.3	5.6

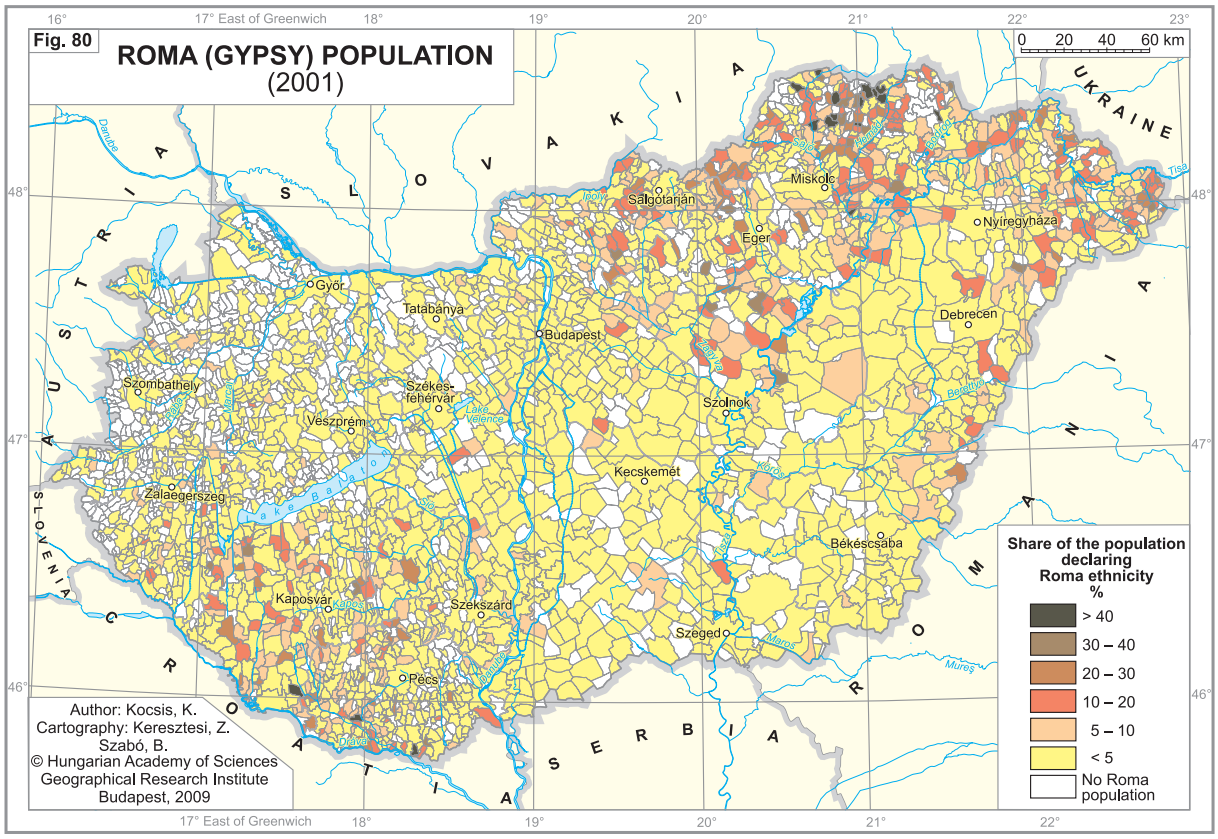
Remark: In 2001 due to the possibility of declaring double, even triple ethnic affiliation the overall figure in total exceed the 100%!
Sources: Mother tongue (1880–2001) and ethnic affiliation (2001*) data of the Hungarian censuses.

and south-western areas are to be considered mixed.

Based on the census of 2001, the Hungarians formed an absolute majority in all but 33 settlements in the country. Between 1990 and 2001, the number of Hungarians dropped by 700 thousand, and increases were only seen in the county of Pest (by 6.4%), as a result of suburbanisation around Budapest, a massive inward migration of residents formerly living in the capital. The most populous centres for the Hungarians were the capital, followed by (in thousands) Debrecen (200), Miskolc (176), Szeged (157) and Pécs (150).

According to the latest census data, 190 thousand people (1.9%) declared Roma (Gypsy) ethnicity. As the Roma tend to consider themselves to belong to the majority nation (in this case to the Hungarians), this number is far less than that claimed by the non-Roma. Prior to the regime change, Hungarian governmental organisations (e.g. county councils and the Central Statistical Office) put major emphasis on the estimation of their 'real' numbers. According to these surveys, the number of Roma was estimated at 325 thousand in 1978, 450 thousand in 1991 and 520 to 650 thousand in 2003. Between 1990 and 2001, the number of those declaring themselves to be Roma increased by 33.1% due to the high natural growth and ethnic dissimilation. The latter process entails Roma that are increasing aware of their Roma identity, who – being Hungarian native speakers – previously declared themselves to be Hungarians, but latterly have chosen to identify with the Roma ethnicity.

The Roma live overwhelmingly in the less urbanised, traditionally rural areas with a highly mixed population from the perspectives of ethnicity and religious denomination. According to the census statistics of 2001, based only on self-declaration, ten villages had an absolute Roma majority. All of them were located in Borsod-Abaúj-Zemplén County, with the exception of Alsószentmárton and Gilvánfa in the county of Baranya (*Figure 80*). Generally it can be stated that nearly two thirds of the Roma languish in highly segregated environments, with a frequent emergence of ethnic ghettos. The regions with an intense enlargement in the Roma population are in North-East Hungary (10–11%), in Nógrád, Borsod-Abaúj-Zemplén and Szabolcs-Szatmár-Bereg counties; the Middle Tisza region; and in South Transdanubia in Baranya and Somogy



counties. Growing ethnic segregation became visible in the second half of the socialist era, when previously depopulating villages and urban areas in decline attracted a mass of Roma migrants. A process of 'ghettoisation' has taken place in cities and towns, and even it absorbed whole regions, leading to a gradual separation of the Roma from the majority of the population.

The settlement area of the ethnic Germans (62 thousand) can be subdivided into five regions, comprising clusters of language islets and diaspora: The West Transdanubian borderland; Transdanubian Mountains; Baranya and Tolna counties; south-western part of Bács-Kiskun County; and other diaspora (mainly in Békés, Pest and Somogy counties). During the course of the deportations of 1946 and 1947, about half the Germans of Baranya, Bács-Kiskun and Komárom counties, along with those of Budapest, were not forced to leave their homes, so they remained. They managed to retain their major concentrations in the eastern part of Baranya County and in the Vértes, Gerecse and Bakony mountains. However, according to census data, only 11 villages had a German ethnic majority, predominantly in the county of Baranya. The largest communities are found in Budapest, Pécs, Sopron, Mohács, Tatabánya, Pilisvörösvár, Csolnok, Hajós and Mór.

The settlement area of the second most populous national minority in Hungary, the Slovaks (12–18 thousand) – due to assimilation and population transfer between 1946 and 1948 – are now to be found in considerable numbers in only three areas (in Békés County, the Pilis Mountains and the common borderland of Pest and Nógrád counties), along with four smaller language islets and diaspora (in the North Hungarian Mountains).

The Croats (14–16 thousand), with regard to their ethnography and regional distribution, can be subdivided into Šokci (South-East Baranya), Bosnians (South Baranya), Bunjevci (Bácska), the Croats of the Drava and Mura regions, and those living along the Austrian border. They form ethnic majority in 11 villages located in the border areas.

Only two thirds of the Romanians (8–9 thousand) live along the present-day Hungarian–Romanian border, due to their internal migration in order to relocate to where the most populous communities are found in Méhkerék, Kétegyháza, Gyula and Elek.

The vast majority of the Serbs (3–4 thousand) live near to the Danube and in the southern border zone (e.g. Lórév, Pomáz, Budakalász, Baja, Mohács, Szeged, Battonya and Deszk), only forming an ethnic majority in Lórév (Csepel Island).

A minority of Slovenes (3 thousand) inhabit a small area of hills near the River Rába. Their most populous communities are to be found in Szentgotthárd and near to the Austrian-Slovenian-Hungarian border in Felsőszölnök.

The number of people belonging to other minorities included in the Act LXXVII/1993 (on the rights of national and ethnic minorities) amounts to around 10 thousand or less: Greeks (10), Ukrainians (9.4), Poles (7.2), Bulgarians (3.5), Ruthenians (2.8), and Armenians (1.8). A characteristic feature of their spatial distribution is that, a quarter to a third of them, are the residents of the capital and they do not form a majority of the local population anywhere. Ruthenians (Rusyns) achieve a considerable proportion in Komlóska (38%) in Zemplén, as do the Greeks in Beloiannisz (23%) in Fejér County. Of the ethnicities that have not been accorded minority rights by the Act, the Chinese (5,196) and Arabs (ca 3,600) are the most numerous.

Church and Religion

Church and religion formed an organic part of Hungarian statehood and society until the mid-20th century. The Carpathian Basin and Hungary was considered to have been the scene of competition between Rome and Byzantium, Western and Eastern Christianity since the 9th century. Despite the conversion of the Hungarians to the Christian faith between the 9th and 11th centuries, and the amalgamation with the Roman (Latin) Church and Western Christianity (1000), owing to the remarkable success of the 16th century Reformation in Hungary, the Catholic Church was unable to occupy a pivotal role in moulding the Hungarian nation and becoming the only solid pillar of self-consciousness, unlike other nations along the 'Catholic-Orthodox frontline' (e.g. the Croats and Poles). Nevertheless, starting with the Counter-Reformation in the 17th–18th centuries, the Roman Catholic Church in Hungary (by this time part of the Habsburg Empire) had become closely interwoven with state institutions and enjoyed a privileged position up to the end of Kingdom of Hungary (1945). In the second half of 20th century, an abrupt change in the attitude of the state toward the Church took place. In 1949 the Hungarian state and the Church officially separated, followed by an era of atheist, anticlerical policies from the Communist totalitarian regime until 1989 (similar to other countries in the Eastern Bloc). In Hungary, the Church played an important role in the maintenance of civil society and upholding ideas of national consciousness during the Socialist era, the reason why religious conviction and ecclesiastical affairs have a broader political context in Hungary than generally in the west. In the second half of the 20th century secularisation gathered pace, supported by the state. Following the regime change, such policies were curbed and reversed, partnered with a religious revival, mainly in rural areas with a Catholic predominance. Another characteristic feature of the new wave of sacralisation is religious pluralisation, manifest in the expansion of other (and not necessarily Christian) churches and small religious communities. The scale of religious pluralisation, associated with the immigration of people belonging to religions not historically present on the territory (e.g. Islam, Buddhism and Hindu), however, is negligible compared to that in western Europe.

Present-day patterns of religious affiliation. According to the census of 2001, 89.2% of the country's population of 10.2 million were willing to respond to the query on religious beliefs or confessional affiliation. Of them, 74.7% declared religious convictions and 14.5% were non-religious or atheist (*Table 14*). Compared to 1949, the number of religious people dropped from 9.2 to 7.6 million, but composition by denomination has changed only slightly. Among believers the share of Catholics somewhat increased (from 70.5 to 73.1%), that of Calvinists remained virtually the same (21.4%), whereas

Table 14. ***Religious structure of the population on the present-day territory of Hungary (1910–2001)***

Denominations	1910	1930	1941	1949	2001
	Population number in thousands				
Total population	**7,612**	**8,685**	**9,316**	**9,205**	**10,198**
Roman Catholics	4,774	5,631	6,120	6,240	5,289
Greek Catholics	165	201	234	248	269
Calvinists	1,633	1,813	1,935	2,015	1,623
Lutherans	484	534	557	482	305
Unitarians	5	7	8	9	..
Orthodox	61	40	38	36	15
Baptists	..	9	18	19	18
Jews	471	445	401	134	13
Other religious	19	5	5	8	79
Non-religious	..	..	..	12	1,483
Unknown	..	..	..	2	1,104
	in %				
Total population	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Roman Catholics	62.8	64.8	65.7	67.8	51.9
Greek Catholics	2.2	2.3	2.5	2.7	2.6
Calvinists	21.5	20.9	20.8	21.9	15.9
Lutherans	6.4	6.1	6.0	5.2	3.0
Unitarians	0.1	0.1	0.1	0.1	..
Orthodox	0.8	0.5	0.4	0.4	0.2
Baptists	..	0.1	0.2	0.2	0.2
Jews	6.2	5.1	4.3	1.5	0.1
Other religious	..	0.1	..	0.1	0.8
Non-religious	..	..	..	0.1	14.5
Unknown	..	..	..	..	10.8

Sources: Data on religious affiliation from the Hungarian censuses.

the ratio of Lutherans, Jews and Orthodox decreased considerably. As a reflection of expanding religious pluralisation, the number of followers of small churches rose from 27 thousand to 97 thousand between 1949 and 2001. As a consequence of decades of atheist, anti-clerical ideology, 86.3% of the non-religious population are younger than 50.

The ratio of religious people is roughly two thirds among those under 30, although it is 80 to 90% for those between 50–70 years of age, and above 90% among those older than 70. Based on the rate of live births per 100 married women older than 15, religious people have a higher fertility rate (189) than non-religious ones (179). The non-religious population are more likely to be found in an urban environment (80% of them are urban dwellers), compared to their religious counterpart (60.1%). The rate of secularisation – in addition to Budapest and other big cities – is particularly high in the former regions of heavy industry (e.g. in the vicinities of Dunaújváros, Oroszlány, Tatabánya and Salgótarján), and in the Middle Tiszántúl region where there is a Protestant (Calvinist and Lutheran) majority (*Figure 81*). In these territories of the Alföld (Great Hungarian Plain), the village poor became highly receptive to socialist ideology as early as the first half of 20th century and Protestant churches have been unable to hang onto their followers and to curb the process of secularisation during recent decades.

The religious spatial pattern of believers has not altered considerably since 1949, with the exception of urban centres heavily affected by socialist urbanisation and internal migration. Today, out of the 19 counties, 17 have a Roman Catholic majority and 2 of them are dominated by Calvinists. There was a Roman Catholic majority in 127 of the 150 statistical microregions, 2 were dominated by Greek Catholics, 14 by Calvinists, and 7 by a non-religious majority in 2001.

The *Roman Catholics* prevail almost everywhere west of the Tisza River, whereas the *Greek Catholics* dominate the border zone between the counties of Szabolcs and Hajdú and the inner areas of Abaúj (*Figure 82*). Despite four decades of atheist socialist propaganda, an eager attachment of Catholic believers to their church remains typical of the western half of Transdanubia and (particularly rural) areas of the North Hungarian Mountains (Nógrád and Heves), along with the southern

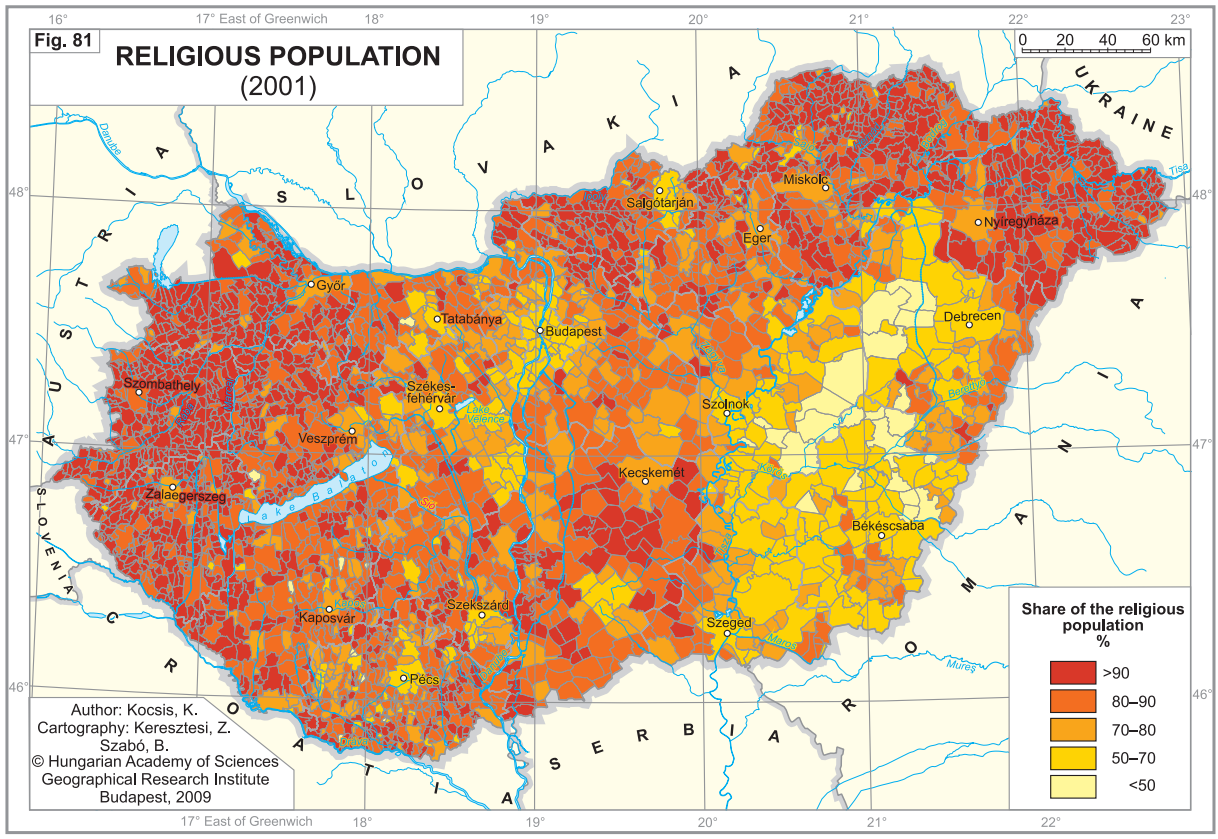


Fig. 81
RELIGIOUS POPULATION
(2001)
0 20 40 60 km
16° 17° East of Greenwich 18° 19° 20° 21° 22° 23°
48° 47° 46°
Miskolc
Salgótarján
Eger
Nyíregyháza
Győr
Tatabánya
Budapest
Debrecen
Szombathely
Székes-
fehérvár
Szolnok
Veszprém
Kecskemét
Zalaegerszeg
Békéscsaba
Kaposvár
Szekszárd
Szeged
Pécs
Share of the religious population %
>90
80–90
70–80
50–70
<50
Author: Kocsis, K.
Cartography: Keresztesi, Z.
Szabó, B.
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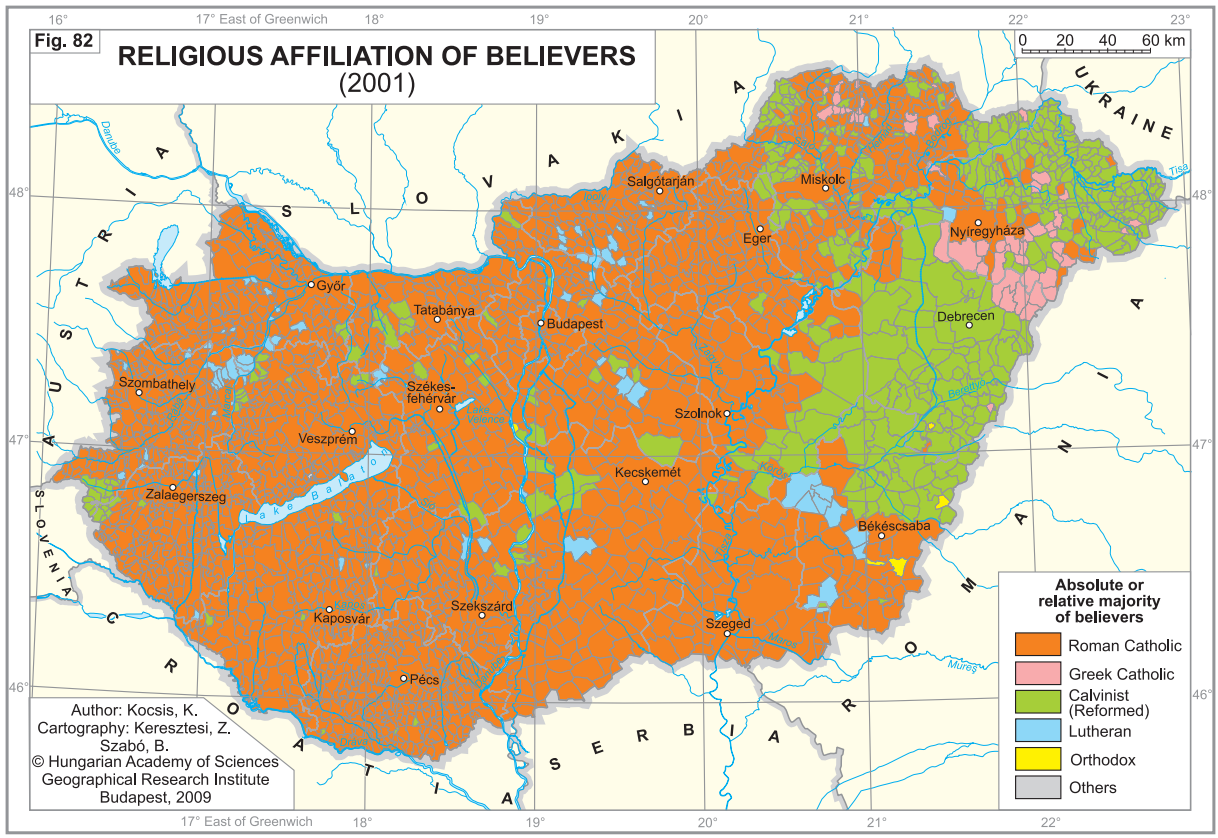
Fig. 82
RELIGIOUS AFFILIATION OF BELIEVERS
(2001)
0 20 40 60 km
16° 17° East of Greenwich 18° 19° 20° 21° 22° 23°
48° 47° 46°
Salgótarján
Miskolc
Eger
Nyíregyháza
Győr
Tatabánya
Budapest
Debrecen
Szombathely
Székes-
fehérvár
Szolnok
Veszprém
Kecskemét
Zalaegerszeg
Békéscsaba
Kaposvár
Szekszárd
Szeged
Pécs
Absolute or relative majority of believers
Roman Catholic
Greek Catholic
Calvinist (Reformed)
Lutheran
Orthodox
Others
Author: Kocsis, K.
Cartography: Keresztesi, Z.
Szabó, B.
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part of the Alföld. In the post-1989 elections these areas proved to be firm supporters of Christian right-wing parties that championed the concept of the Hungarian nation. The seat of the Hungarian Catholic Church has been Esztergom since the year 1000, and the country's territory is subdivided into 4 archbishop's provinces (Esztergom-Budapest, Kalocsa-Kecskemét, Eger and Veszprém), 12 bishoprics (e.g. Győr, Szombathely, Kaposvár, Pécs, Székesfehérvár, Szeged, Vác and Debrecen-Nyíregyháza) and an abbey of diocesan right (Pannonhalma). The seat of the Hungarian Greek Catholic Church is Hajdúdorog.

Areas of *Calvinist* dominance are focused in the county of Hajdú-Bihar and the north-eastern part of Szabolcs-Szatmár-Bereg County. The latter is an outlying region on the upper reaches of the Tisza, bordering with Ukraine, where the attachment of Calvinist believers to their church is very strong, and much stronger than that of the Protestants living in the Middle Tiszántúl region. The Hungarian Reformed Church is subdivided into 4 church districts (with seats in Debrecen, Miskolc, Budapest and Veszprém). There are two Calvinist universities (in Debrecen and Budapest), and their academies (ancient secondary schools founded in 1531 and 1538) are in Debrecen, Sárospatak and Pápa.

Lutherans form the majority of the population of some tens of (formerly ethnic Slovak) settlements, primarily in counties of Békés, Nógrád and Pest. Their largest congregations live in Budapest, Békéscsaba and Nyíregyháza. There are three Lutheran districts in the country (their seats are Budapest and Győr).

In 2001 a mere 12,871 persons declared a religious affinity with Judaism, but estimates put the actual number of Jews between 64 and 120 thousand. Since 1945 around three-quarters of them live in Budapest and there are smaller communities in Debrecen, Szeged, Miskolc and Pécs.

Settlements

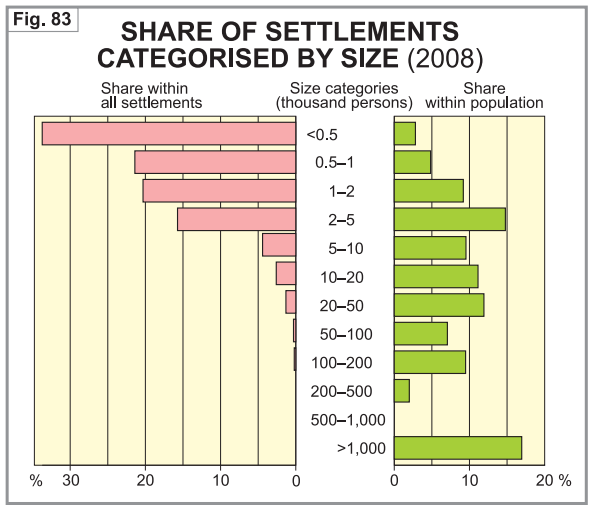
Settlement System

In Hungary, settlements as functional units can be best described as independent, local governments, and the boundaries between settlements and local governments as a rule coincide. Rare exceptions are represented by the districts of Budapest, and the so-called 'tanya' settlements (scattered farmsteads) of the Alföld, where administrative boundaries do not coincide with the physical boundaries of human settlements. In the case of the former, the Hungarian capital is divided into 23 fairly autonomous districts, whereas the latter are an integral part of larger villages and towns in their vicinity.

On 1 January 2008, the number of local governments in Hungary was 3,151, disregarding the districts of Budapest. The number of independent local governments has gradually increased since the regime change (1993: 3,108; 2001: 3,135; 2008: 3,152) which is the product of the separation of settlements, i.e. where smaller settlements previously incorporated into larger towns have gained independence. The average population figure for Hungarian settlements (i.e. public administrative units) is 3,188.

Fragmentation and concentration are equally present in the Hungarian settlement system (*Figure 83*). One third of settlements are below 500 inhabitants (1,062 settlements = 33.7% of the total), and 362 settlements have less than 200 people. A further 21.4% of settlements have a population between 500–1000. The result is that 55.1% of Hungarian settlements have less than 1,000 inhabitants. On the other hand, the only city with a population in excess of one million is Budapest, which concentrates 17% of the total population. In terms of ranking by size, Budapest is followed by Debrecen which has 205 thousand inhabitants. Thus, the gap between Budapest and the country's other major cities is very wide. Nevertheless, if we focus on population distribution by settlement category, we see a somewhat different picture. Very small villages (below 200 inhabitants) concentrate only 0.4% of the total population, and only 7.6% of Hungarians live in settlements with less than 1,000 inhabitants.

Fig. 83



In the Hungarian settlement system, the size (i.e. population figure) of a settlement has a strong impact on its development potential, the quality of services, the characteristics of the labour market, incomes of inhabitants and migration flows. Smaller settlements (villages) were especially disadvantaged within the settlement system after World War II. Since agricultural employment steadily decreased during the socialist era (1949: 53.8%; 1960: 38.5%; 1980: 18.6%) villages were especially hard hit by economic modernisation and industrialisation. Many of the active wage earners from smaller villages became commuters already before 1990. The shrinkage of those employed in agriculture continued after 1990 and by 2001 only 5.5% of the economically active worked in agriculture. Thus, it is easy to understand why on the eve of the 2001 national census, 68.4% of employees living in villages below 500 inhabitants were classed as commuters.

Commuting has also encouraged the outward migration of people from smaller settlements and hence hastened population loss from these settlements. The exodus of people from smaller villages was most intense in the 1960s, when public services including health care, primary education, nurseries, public ad-

ministration, etc., along with the headquarters of agricultural cooperatives were nationally reorganised and many smaller settlements lost their basic institutions. This process was strongly supported, and justified, by the settlement policy of the communist regime. The products of this rationalisation policy were the result that typically only 1% of settlements below 500 inhabitants had a pharmacy, 3.4% had schooling for the upper four classes of primary-age children, 4.1% retained a medical doctor, 4.5% had some form of public administration, and 9.5% provided a home to the headquarters of an agricultural cooperative. Adequate public and economic services were only available in settlements with more than 3,000 inhabitants. The deliberate concentration of public institutions and economic services in the higher levels of the settlement hierarchy had painful consequences for the living conditions of people in small villages. As a result, most of the regions where small villages prevailed became very much deprived socially and economically during the 1970s and 80s.

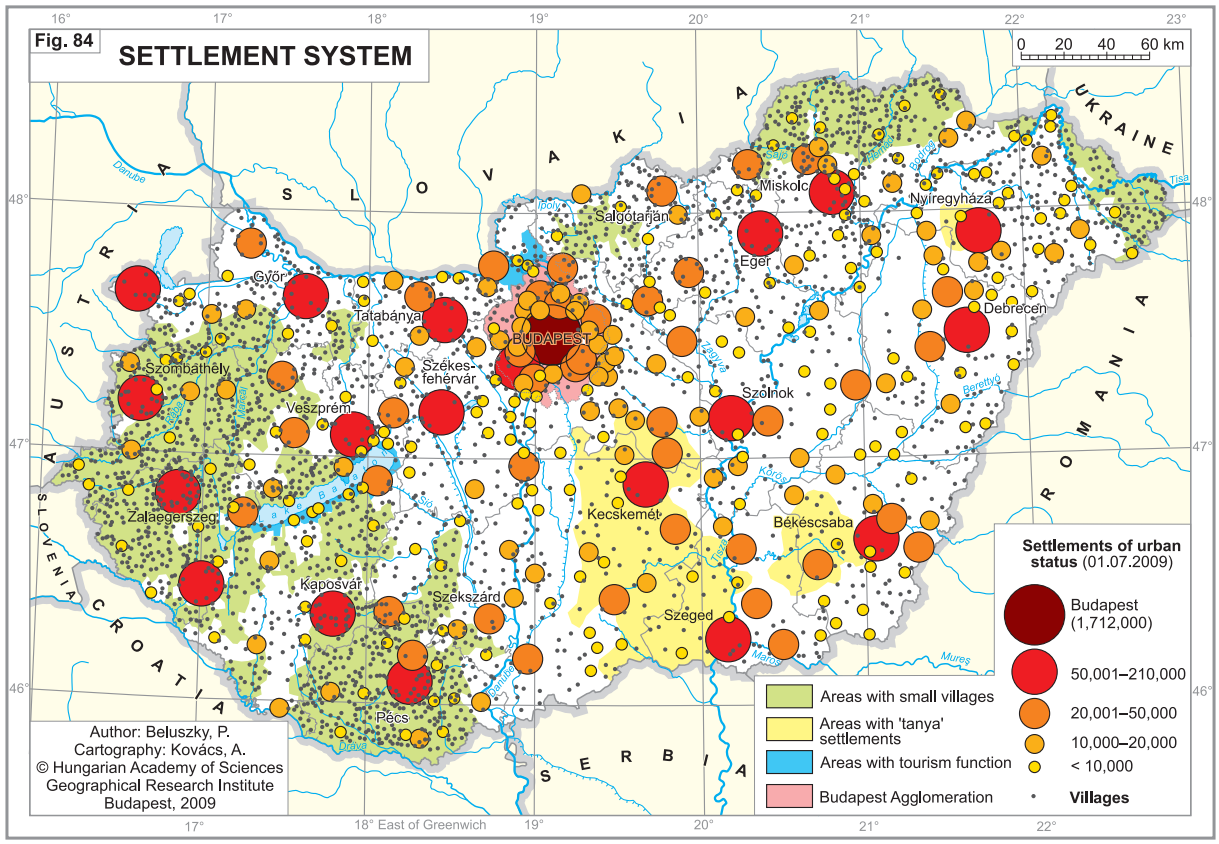
The political changes of 1989–90 considerably decreased the disadvantages of smaller settlements. Every settlement became independent, with the right to decide freely over the provision of public services and the establishment of local authorities, including notary offices. Subsidies from the central budget were aligned in proportion to the number of inhabitants and settlements could use these resources as they wished. The introduction of the market economy and growing motorisation has also contributed to the improvement in working and living conditions for residents in small villages. Despite all these changes, socio-economic indicators of the population still show a strong correlation with the settlement size in Hungary (*Table 15*). Generally it can be concluded that the average (taxable) income of active earners increases with settlement size, just as the level of services does, which in turn directly impacts upon migration patterns. Smaller settlements tend to loose population due to migration, whereas the bigger ones are growing.

The spatial distribution of settlements of different size is very imbalanced (*Figure 84*). This is partly the outcome of the physical geographic features of the country; hilly regions are characterised mainly by their smaller settlements. On the other hand, the historical development of the country has also significantly shaped the settlement pattern. The Ottoman Empire occupied the southern part of Hungary (the Alföld, or Great Hungarian Plain) in the 16th–17th centuries and perpetual warfare destroyed substantial parts of the original settlement system. As a consequence, the density of settlements and the average size of towns and villages significantly differ in the various regions of Hungary today. In South and West Transdanubia, as well as in North Hungary, the number of settlements per 100 km^2 is above 5 (national average: 3.4), whereas on the Alföld the figure is below 2 (*Figure 85*).

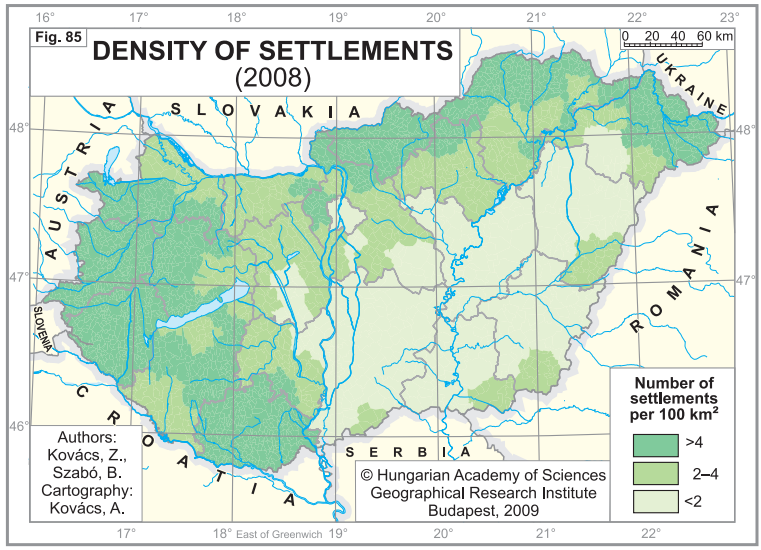
Table 15. ***Number of settlements grouped by population size and some relevant indicators (01.01.2008)***

Population size categories	Number of settlements	Urban settlements	Population	Urban population	Population density (persons/km^2)	Migration balance (2007, ‰)	Average income per tax-payer**	Average number of shops
–199	362	–	43,585	–	14.8	-16.9	1,186,012	1.29
200–499	700	–	237,842	–	25.2	-9.1	1,238,443	2.94
500–999	674	–	486,438	–	36.1	-6.3	1,308,897	6.33
1,000–1,999	640	4	921,012	5,937	48.4	-3.4	1,391,550	14.00
2,000–4,999	496	58	1,484,595	218,391	71.0	-2.0	1,462,072	35.40
5,000–9,999	138	96	960,713	689,180	95.3	1.1	1,541,239	106.61
10,000–19,999	81	79	1,139,728	1,118,443	155.8	0.0	1,680,105	248.06
20,000–49,999	41	41	1,202,742	1,202,742	205.4	0.7	1,742,610	588.78
50,000–99,999	11	11	708,831	708,831	513.4	0.7	1,846,224	1,286.18
100,000–199,999	7	7	952,552	952,552	587.3	2.9	1,881,464	2,799.43
200,000–*	2	2	1,907,381	1,907,381	1,933.0	3.6	2,358,974	18,231.15
Total	**3,152**	*** **298**	**10,045,401**	**6,803,439**	**108.0**	**–**	**1,757,931**	**51.55**

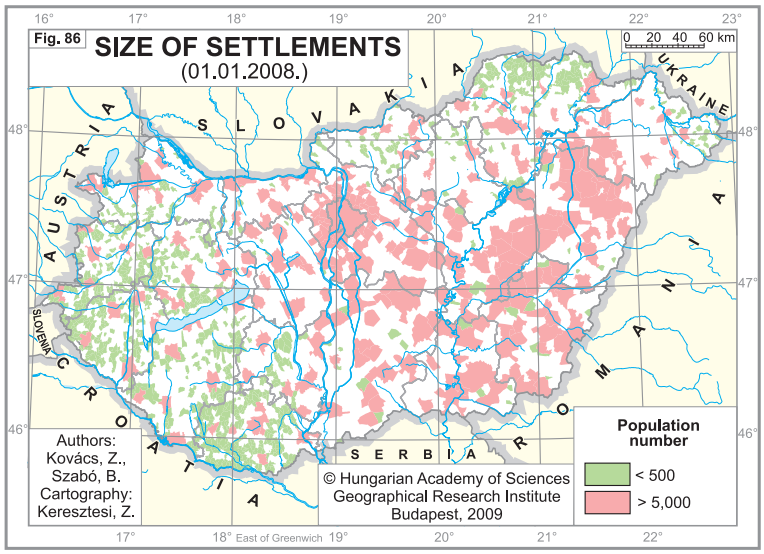
Remarks: *Debrecen (205,084 inhabitants) and Budapest (1,702,297 inhabitants).
**Personal income tax, HUF.
*** On 01.07.2008 another 8 settlements received urban status.

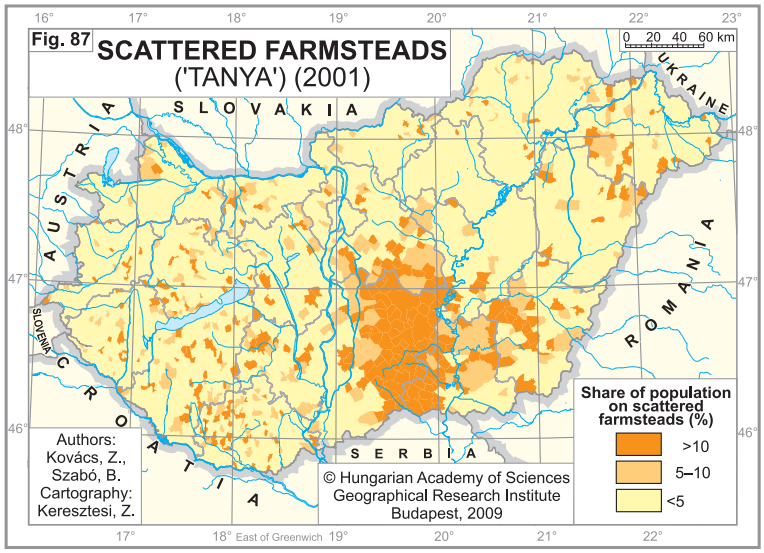


Taking into account the size of settlements that settlements with more than 5,000 inhabitants are concentrated mostly on the Alföld and around Budapest. This picture is further refined by the spatial distribution of small settlements with less than 500 inhabitants (*Figure 86*). In some counties of Transdanubia (e.g. Vas, Baranya and Zala) over 60% of settlements belong to this size category. On the other hand, in the counties of the Alföld they play a subordinate role.



The so-called 'tanya' settlements (i.e. scattered farmsteads) of the Alföld occupy a special niche in the Hungarian settlement system. Their origin goes back to the period of the Turkish occupation, when less populous settlements were completely destroyed and only bigger towns could survive in exchange for heavy taxes paid directly to the Sultan. After the withdrawal of the Turks during the late 17th century, the density of settlements was very low in South-East Hungary and settlement re-establishment was limited, thus a large part of the land between the existing settlements remained uncultivated. In the 18th century the first 'tanya' settlements were established in these outlying areas. They were used as temporary shelter by residents of nearby towns, who cultivated the land (grazing, farming, etc.) in the growing season. The regulation of lowland rivers (e.g. the Tisza) in the middle of the 19th century added vast areas to the stock of uncultivated land on the Alföld, where new 'tanya' settlements were built. In the second half of the 19th century, the first demographic transition be-





came visible in Hungary. The rapid population growth and the lack of housing in the core settlements generated an exodus of younger people to the 'tanya' settlements which became permanently inhabited thereafter. The population living in 'tanya' settlements reached its peak in 1949, when more than 1.1 million people lived on these scattered farmsteads. The share of 'tanya' dwellers was 33% on the Alföld. The settlement policy of the communist regime targeted the demolition of these settlements and residents were moved to nearby villages. The buildings were pulled down, and construction of new 'tanyas' was strictly prohibited. Due to the active destruction of these tiny settlements and intense ageing of their inhabitants, the number of people living on a 'tanya' had dropped to 200 thousand by 1990. Since the regime change, political opposition to 'tanyas' has vanished, and in the environs of bigger towns (e.g. Kecskemét and Szeged) there is even a revival underway, due to suburbanisation, and new private ventures in agriculture or tourism. Today, the share of the population living on 'tanyas' is the highest in South-East Hungary, and particularly in the Danube–Tisza Interfluve (mainly in the region of Kiskunság) (*Figure 87*).

Urbanisation and the Urban Network

Hungarian society remained predominantly agrarian until the end of World War II, and communist industrialisation commenced with the advent of the 1950s. Urbanisation and urban development in Hungary was considerably behind that of Western Europe. Modern industrial development driven by foreign capital (Austrian and Czech) only started in the 1870s and remained restricted mainly to Budapest and to a couple of bigger towns. In 1870 the proportion of the urban population was only 12.8%. Due to capitalist industrialisation and growing rural to urban migration, the national urban ratio increased to 16.7% by 1910.

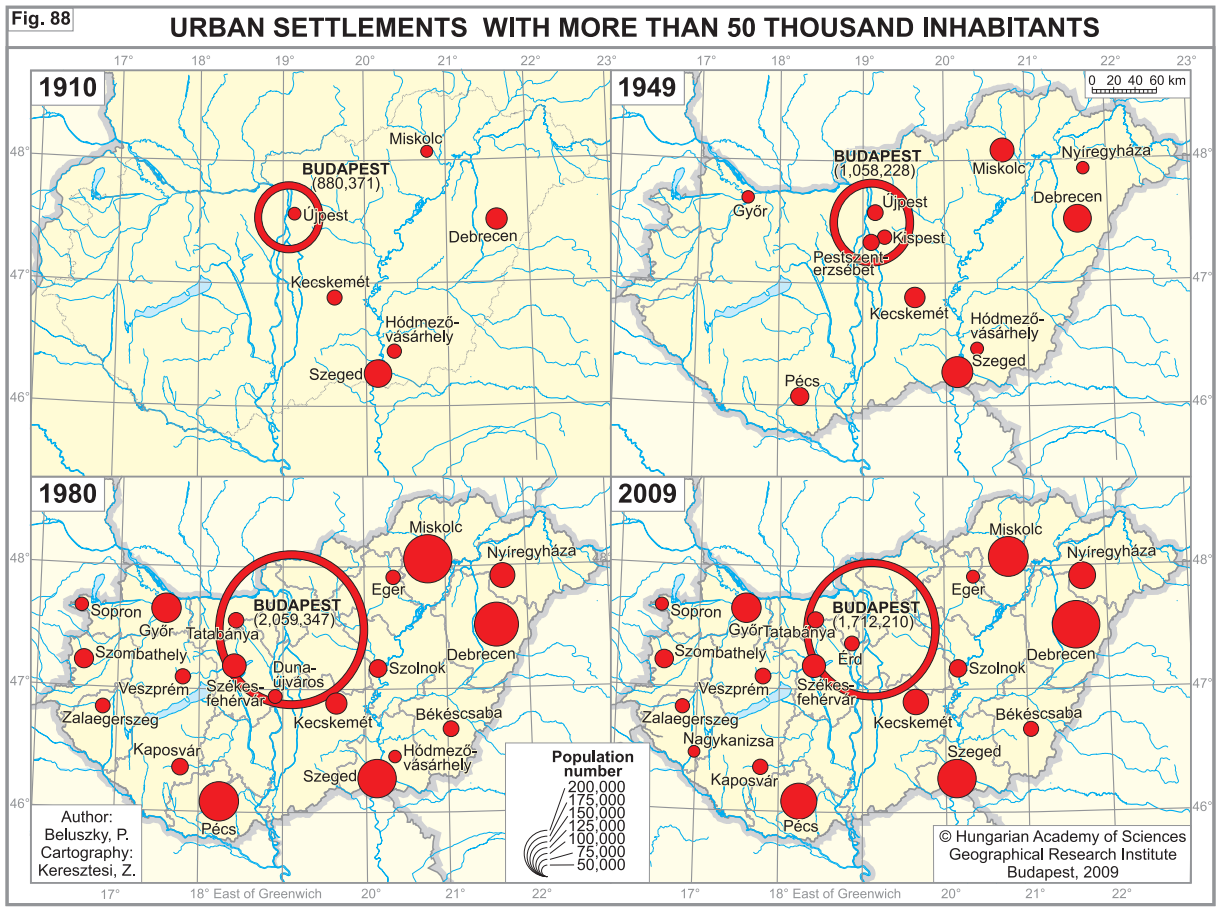
A special feature of urbanisation prior to World War I was the rapid growth of Budapest. On the eve of its administrative establishment in 1873, with its population of 280 thousand

the Hungarian capital ranked only seventeenth among the large European cities. By the 1910 census, the population had tripled to 880 thousand, and the city advanced to seventh place in Europe. By the start of World War I, Budapest had an economic and cultural influence stretching far beyond the borders of the Austro-Hungarian Empire, as far as the Balkans and North Italy, and it was a rival of Vienna in many respects. As a consequence of rapid urban growth, the weight of Budapest within the country gradually increased. In 1870 only 2% of the country's population lived in the city, but by 1910 this figure had reached 4.8%. As a consequence of the buoyant urban growth, a wide zone of suburban settlements evolved around Budapest. The number of inhabitants in the evolving agglomeration zone rapidly increased to 230 thousand by 1910. Small villages developed into medium-sized cities within a few decades, e.g. the population of Újpest grew from 6,722 in 1870 to 55 thousand in 1910.

New elements of the urban network were mining and industrial centres like Diósgyőr (today in Miskolc), Ózd and Salgótarján. Although urban development in general was vigorous in the country before 1914, the dynamism of Budapest could not be challenged by other centres. If we take the indicators of economic growth and dynamism of the ten regional centres of Hungary at that time – i.e. Zágráb (Zagreb), Kolozsvár (Cluj), Pozsony (Bratislava), Szeged, Kassa (Košice), Debrecen, Pécs, Temesvár (Timişoara), Nagyvárad (Oradea) and Arad – the aggregate figures for these cities fell far behind the level of Budapest. On the present territory of Hungary there were only seven cities with more than 50 thousand inhabitants in 1910 (*Figure 88*). Of them, Újpest was a suburb of Budapest, whereas Kecskemét and Hódmezővásárhely were both agrarian towns, poorly provisioned with central functions and where a substantial part of the population lived on individual farmsteads.

World War I and the subsequent Peace Treaty of Trianon in 1920 altered the conditions of urban development across the country. Due to the treaty, Hungary lost 71.4% of its territory and 63.5% of its population. By virtue of the stipulations of the peace treaty, a new regional order

Fig. 88



was established in the Carpathian Basin, and the socio-economic character and urban pattern of Hungary were fundamentally changed. In 1918 there were 139 settlements with urban status in Hungary, whereas in the country's new, reduced territory only 47 remained. One of the important characteristics of the Hungarian urban network was the extreme increase of the weight of Budapest as a primate city. Post-Trianon Budapest became the capital city of a country of only 7.6 million inhabitants, instead of 21 million, which was Hungary's population prior to 1920. In 1910 Budapest concentrated less than 5% of the population of the country; this figure had grown to 12% by 1920, and even further to 18% by 1941.

Trianon resulted in Hungary losing seven out of its ten major regional centres, and only Szeged, Debrecen and Pécs remained within the limits of the new boundaries. Economically, Budapest became the absolute dominant centre, or as many call her, the country's 'swollen head'. Besides Budapest, no other major centres were able to develop, and typically the second largest towns (Debrecen and Szeged) were ten times smaller than the capital city. The urbanisation process of the interwar period also concentrated mostly on Budapest and its environs. The development of other towns slowed, not least because in many cases the new borders divided urban centres from large parts of their tributary areas, cutting off their organically grown connections. This, of course, had serious economic and social consequences as the development of these towns has ever since been significantly stunted and their rate of population growth has fallen behind the national average. This is also confirmed by the statistics: in Hungary the ratio of urban population hardly showed any increase between 1920 and 1940 (31.8% and 34.6%, respectively) and the Hungarian urban network changed little in the interwar period compared to previous decades. The discrepancy between towns that were legally titled as such, versus the town-like functions they performed, remained intact. At the end of World War II, in total 56 Hungarian settlements were legally accorded town status, whereas the number of centres that bore urban functions was about 150. The lack of a functionally well developed network of small towns became remarkable.

By 1949, 37% of the total population lived in the then 54 urban settlements, hence Hungary was still predominantly a rural country compared to the West. The number of cities with more than 50 thousand inhabitants increased to 12 by 1949, but three of them (Újpest, Kispest and Csepel) were soon amalgamated with Budapest as part of the 1950 administrative reform. Thus, the skeleton of the Hungarian urban network was constituted by only nine cities.

After World War II, in line with the geopolitical changes in East Central Europe, a socialist-style centrally planned economy, and single party system was introduced in Hungary. The main objective of the communist regime's economic policy was – at least during the 1950s and 60s – rapid industrialisation in order to catch-up with the West. Industrialisation not only meant the concentrated development of mining and production, but also involved the internal reorganisation of agriculture, i.e. collectivisation and the establishment of large scale agricultural plants (state farms and cooperatives). The net result was a radical change in employment trends. The number of industrial employees increased from 882 thousand to 2 million between 1949 and 1970, and the share of industry within national employment grew from 21.6% to 43.7%. Industrial development was mainly the designated activity of large and medium sized cities, but there were also some new towns established. Large scale industrial investments were carried out in these settlements, and next to the new industrial plants, huge housing estates were erected. On average 90% of communal investments were realised in towns in the 1950s. The central functions of cities were also enriched by new institutions (such as secondary schools, hospitals, public administration offices, libraries, theatres, etc.). All these served to generate a widening gap between cities and villages in terms of living conditions, and resulted in a massive rural to urban migration in Hungary. As a consequence of this spatial shift of population, the number of Budapest's inhabitants grew by 200 thousand, and that of other cities by an aggregate 700 thousand in the 1960s. The migration process however gradually slowed from the early 1970s onwards, and between 1970 and 1980 there were already some cities (most of them located on the Alföld) where the balance of migration turned negative. The number and ratio of the urban population also dynamically increased. By the late 1970s, Hungarian society became increasingly urban, as 53% of the population lived in cities in 1980 (*Table 16*). The number of cities with more than 50 thousand inhabitants

also significantly increased. In 1980, already 20 settlements fell into this category, among them Dunaújváros (61 thousand), an emblematic new town of the communist regime.

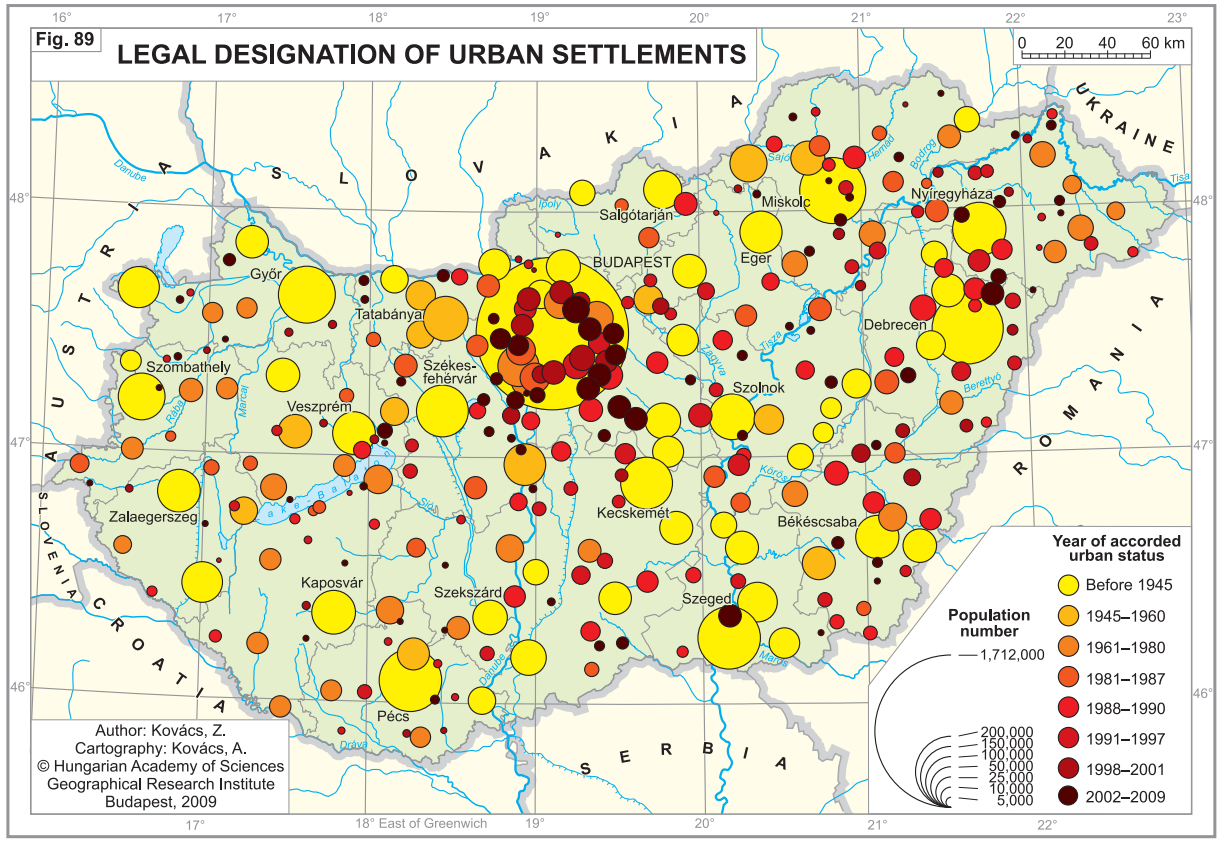
In addition to rural to urban migration, another 'source' of urbanisation was the administrative designation of new towns during the communist period. The number of officially recognised urban settlements in Hungary increased from 54 in 1950, to 166 in 1990 (*Table 16*). The systematic use of the 'legal factor' in urbanisation was partly associated with growing state intervention and the centrally planned character of economic modernisation. As a consequence the urban ratio of the country increased steadily and by 1990 already 62% of the Hungarian population lived in urban settlements.

When examining the number of newly designated towns, the communist era can be divided into two periods. Between 1950 and the late 1960s, the re-designation of villages to towns was comparatively moderate and only 9 settlements were accorded the elevated status (*Figure 89*). The majority of them were so-called socialist new towns; settlements developed most often around an industrial facility or mine, typical examples of which are Dunaújváros (formerly 'Stalin City', with its large steelworks on the Danube south of Budapest), or Tiszaújváros (formerly 'Lenin City' with a petrochemical industry), Oroszlány (coal mining), Komló (coal mining), etc. Another important element of the urban development strategy in the 1950s and 60s was the modernisation and intensive de-

Table 16. Number of urban settlements (1945–2008)

Date (01.01.)	Number of urban settlements	Ratio of urban population %
1945	52	32***
1950*	54	36
1960	63	40
1970	73	45
1980	96	53
1988	125	58
1990	166	62
1995	194	63
2000	222	64
2002	252	66
2006	289	67
2008	298	68
2009**	328	69

Remarks: *Between 1945 and 1950, 6 towns were administratively attached to Budapest **On 01.07.2009 22 settlements received urban status. ***estimated figure.



velopment of old industrial centres, e.g. Ózd, Tatabánya and Salgótarján.

From the beginning of the 1970s, the re-designation process of new towns gathered pace remarkably. This was partly the consequence of the 'National Settlement Development Concept' (OTK) approved in 1971, which specified a strict order of rank among settlements and tried to slow the growth of Budapest by strengthening the five largest provincial cities: Debrecen, Győr, Miskolc, Pécs and Szeged. As a result of the Concept, the national urban network was significantly extended during the following decades. The majority of newly designated towns had long traditions of urban functions and possessed a zone of influence greater than that of a mere village.

This indicated that the allocation of urban status was a warranted adjustment in the administrative divisions of the country, to align them with the pre-existing organic development of the settlement system, rather than just a mere legal step. As a consequence, one of the major contradictions of the Hungarian urban system, deriving from the difference between the numbers of towns in a legal as opposed to a functional sense, gradually disappeared. By the end of the 1980s the Hungarian urban system already included most settlements that were in reality functioning as cities.

After 1989 due to the radical political and economic changes, the conditions of urban development changed fundamentally. Acting together, the introduction of the market economy, re-establishment of the system of local government, deregulation of the planning system, deindustrialisation in the economy and liberalisation of the property market led to new spatial phenomena in urbanisation. Suburbanisation and desurbanisation became typical, inducing population loss in cities. A typical example of this phenomenon is Budapest, where the population figure shrank from 2 million to 1.7 million between 1990 and 2009. Only a couple of towns and suburban settlements were able to register modest population growth in the last two decades.

On the other hand, as part of the democratisation process, the legal promotion of villages to 'town' status became much simpler. Due to the liberal system of legal definition, 162 settlements have been accorded town status since 1990, and the number of urban settlements – at least in a legal sense – had grown to 328 by 1 July 2009. Owing to the frequent legal re-labelling of villages into towns, the Hungarian urban system became spatially denser and more balanced after 1990. Vast areas without any towns have virtually disappeared and even regions with astonishingly high densities of urban area (e.g. the BMR, or the region around Lake Balaton) can now be identified. The large scale extension of the urban system has resulted in a growing number of small towns, and even the emergence of 'dwarf' towns. One fifth of Hungarian towns have less than 5,000 inhabitants, and four of them have even less than 2,000. The re-designation process has brought about a continual devaluation of urban status, since a significant portion of the newly designated towns are in fact villages, both in a functional and infrastructural sense.

Despite the mushrooming of new towns, the national urban ratio has increased by only 7% since 1990. Today 69.3% of the population of Hungary live in urban settlements, and with this figure Hungary is below the European average. If we consider only those cities and towns (166) that acquired urban status before 1990, the level of urbanisation would be 58%. This is a clear indication that Hungary entered a new phase of urbanisation after 1990. The relative decline in the urban population can be explained by essentially two factors: natural decrease and a negative migration balance (i.e. suburbanisation and desurbanisation).

Another outcome of the transformation has been that the gap between towns and villages has generally narrowed. This can be partly explained by the introduction of the market economy and the re-emergence of local governance. After 1990, the allocation of resources became fairer than under the previous regime, privileges granted for towns were withdrawn, and villages gained more opportunities for infrastructural development. In summary, this resulted in improvements in local infrastructure, better services and living conditions in rural areas, assisting villages to hang onto their inhabitants and attract new ones.

Hungarian towns can be classified according to a hierarchical grading system (*Figure 90 and Table 17*). The basis of the classification is size, along with the central functions they perform for the surrounding regions through their commercial, administrative, cultural etc. institutions. Selected indicators reveal a strong concen-

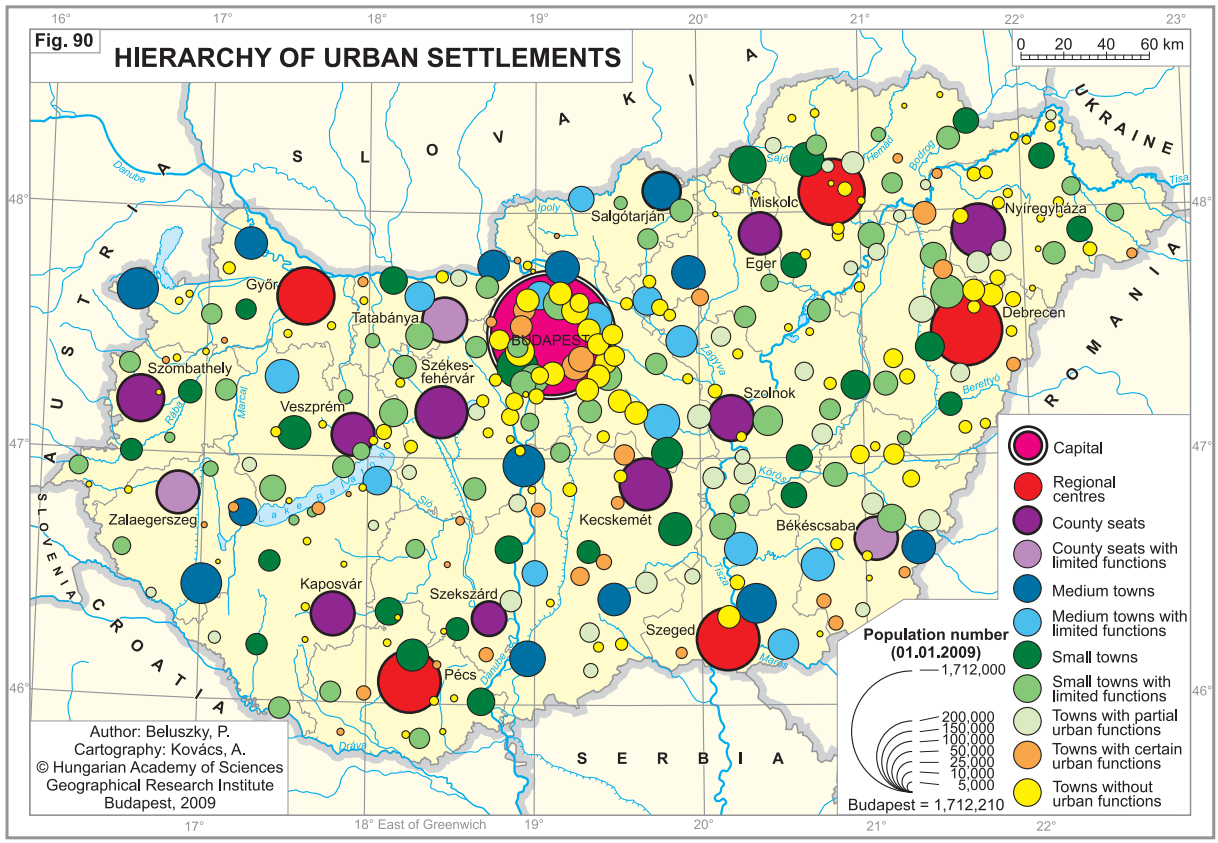


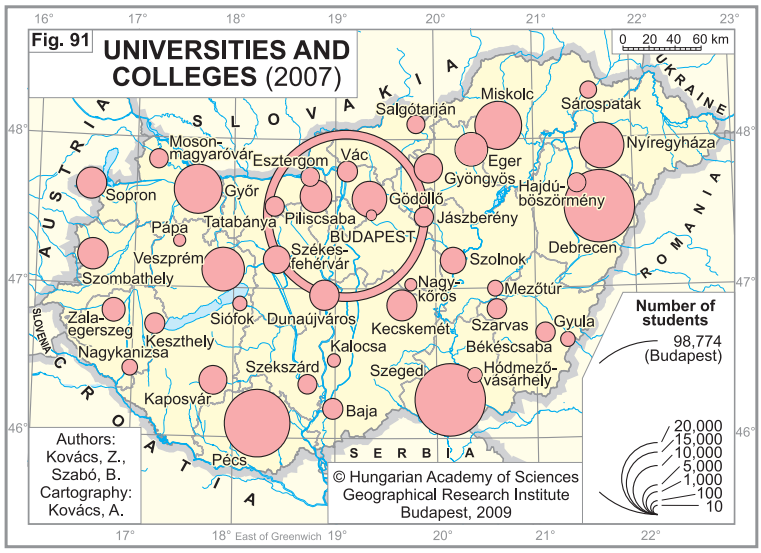
Table 17. ***Hierarchy of urban settlements (01.01.2009)***

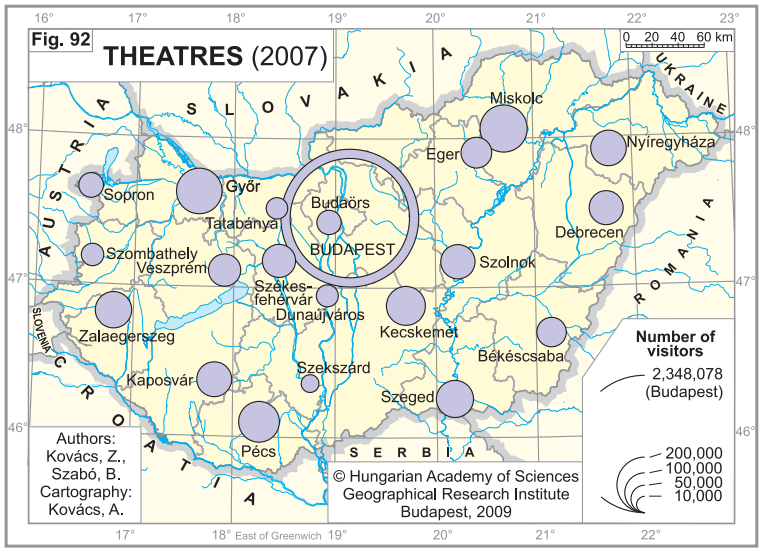
Level of hierarchy	Number of settlements
1. Capital	1
2. Regional centres	5
3. County seats I	9
II	4
4. Middle-sized towns I	12
II	13
5. Small towns I	28
II	56
6. Small towns with partial urban functions	37
7. Small towns with limited urban functions	33
8. Small towns without real urban functions	108
Total	**306**

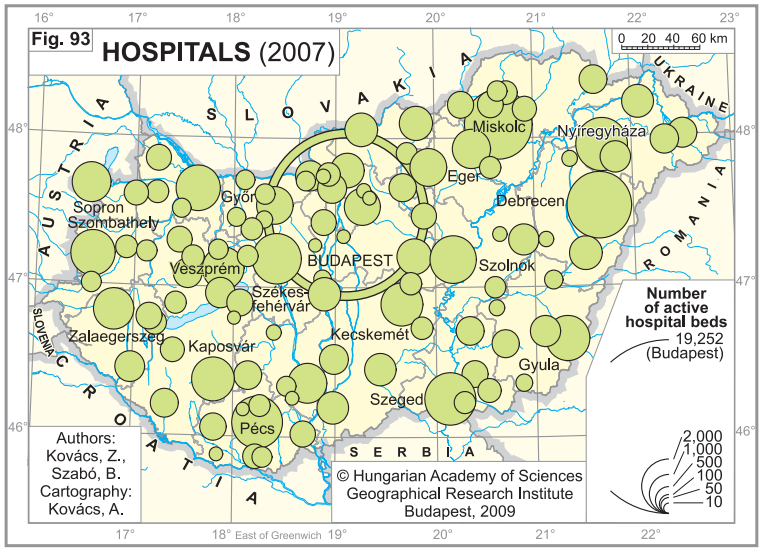
tration of urban functions within the country (*figures 91 through 93*), whilst a study of the hierarchy reveals that approximately 130 Hungarian cities and towns function as real urban centres, another 70 occupy an intermediate position between towns and villages, and there are 100 legally defined towns without real urban functions. The outstanding position of Budapest within the Hungarian urban system is highlighted by the fact that the aggregate population of the 5 regional centres (Debrecen, Győr, Miskolc, Pécs and Szeged) struggles to total half that of the capital city. The primacy of

Table 18. ***The primacy of Budapest according to different indicators (2007)***

Indicators	National figure	Value of Budapest	Share of Budapest %
Population number	10,045,401	1,702,297	16.9
Visitor nights in hotels (thousand)	2,906	2,017	69.4
Books in specialised libraries (thousand)	58,822	36,353	61.8
Shareholding companies	4,493	2,415	59.8
Researchers employed in research institutes	17,391	10,336	59.5
Theatre visits (thousand)	4,049	2,288	56.5
Graduate students	226,642	98,063	43.3
Tutors in institutions of higher education	22,342	9,423	42.2
GDP (million HUF)	23,795,306	8,874,185	37.3
Employees	3,007,033	888,563	29.6
Telephone lines	3,281,523	922,363	28.1
Active hospital beds	71,902	19,252	26.8







Budapest within Hungary is even more prominent in other fields, as confirmed by selected socio-economic indicators (*Table 18*).

On the basis of their specialised urban functions and local economy, an alternative classification of Hungarian towns seems to be possible, even though the economic transformation (i.e. deindustrialisation and boom in the tertiary sector) of the last two decades has diminished previously acute differences (*Figure 94*). Today, ten major types of town can be distinguished in Hungary; in some cases subgroups can also be identified.

With respect to the quality of the technical infrastructure, a marked east–west polarisation can be identified in the settlement system. This is partly the heritage of the past, as the regional development pattern of Hungary has always been determined by a distinct east–west dichotomy. On the other hand, the outcome of the recent socio-economic transition and the changing economic fortunes of the regions have also contributed to the polarisation of the settlement system. An increasing regional differentiation can be seen by examining indicators of public services (*figures 60, 95 and 96*).

On the basis of the outcome, the favourable position of North Transdanubia and Budapest becomes quite evident. Rapid modernisation of the housing stock and communal infrastructure in the west; stagnation and low levels of modernisation in the east are the results of the transition. Thus, geographical location is increasingly responsible for the widening gap within the national settlement network.

Equally strong polarisation has occurred in the metropolitan region of Budapest since 1990. Due to intensive suburbanisation, the population of Budapest has been

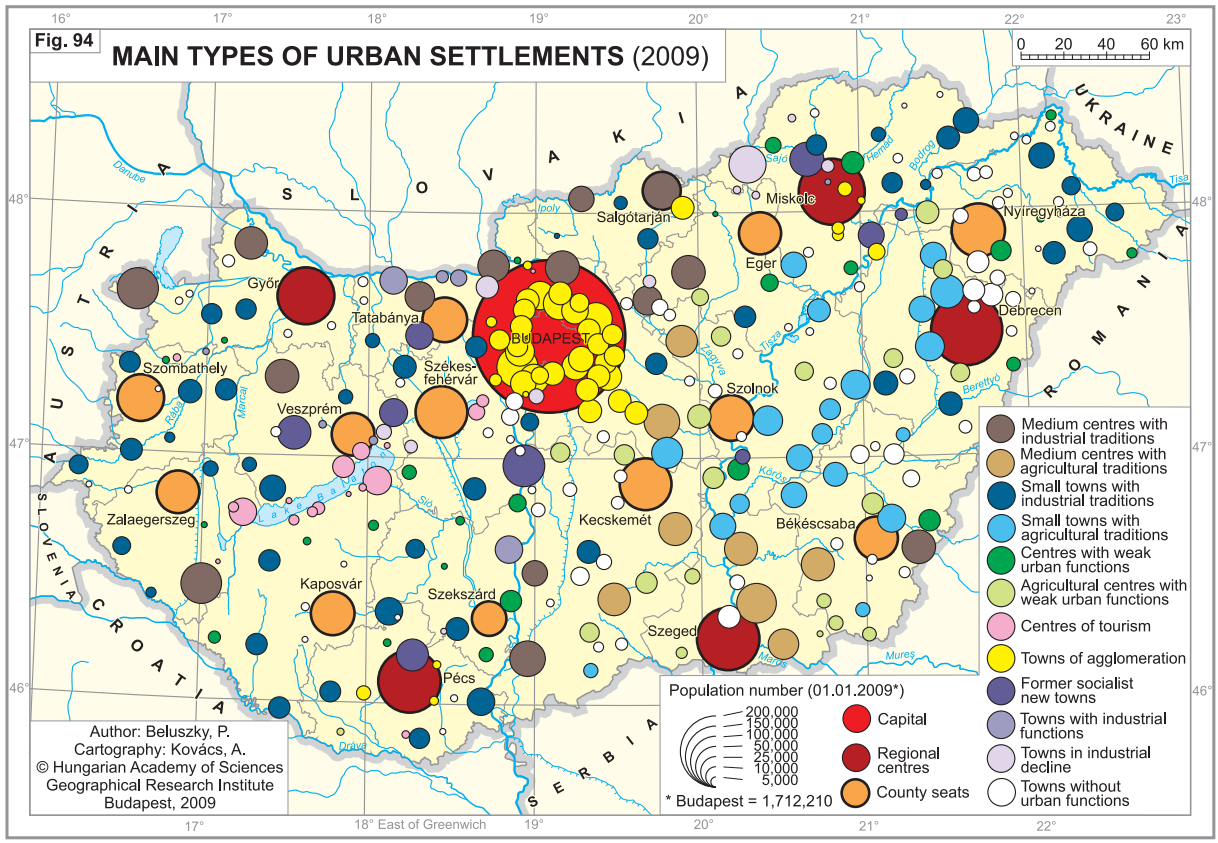


Fig. 94
MAIN TYPES OF URBAN SETTLEMENTS (2009)
0 20 40 60 km
Medium centres with industrial traditions
Medium centres with agricultural traditions
Small towns with industrial traditions
Small towns with agricultural traditions
Centres with weak urban functions
Agricultural centres with weak urban functions
Centres of tourism
Towns of agglomeration
Former socialist new towns
Towns with industrial functions
Towns in industrial decline
Towns without urban functions
Population number (01.01.2009*)
200,000
150,000
100,000
50,000
25,000
10,000
5,000
Capital
Regional centres
County seats
* Budapest = 1,712,210
Author: Beluszky, P.
Cartography: Kovács, A.
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Geographical Research Institute
Budapest, 2009
BUDAPEST
Miskolc
Salgótarján
Nyíregyháza
Debrecen
Eger
Győr
Tatabánya
Székes-fehérvár
Szombathely
Veszprém
Szolnok
Zalaegerszeg
Kecskemét
Békéscsaba
Kaposvár
Szekszárd
Szeged
Pécs
AUSTRIA
SLOVAKIA
UKRAINE
ROMANIA
SLOVENIA
CROATIA
SERBIA
Danube
Tisza
Drava
Mura
Lake Balaton
17° East of Greenwich

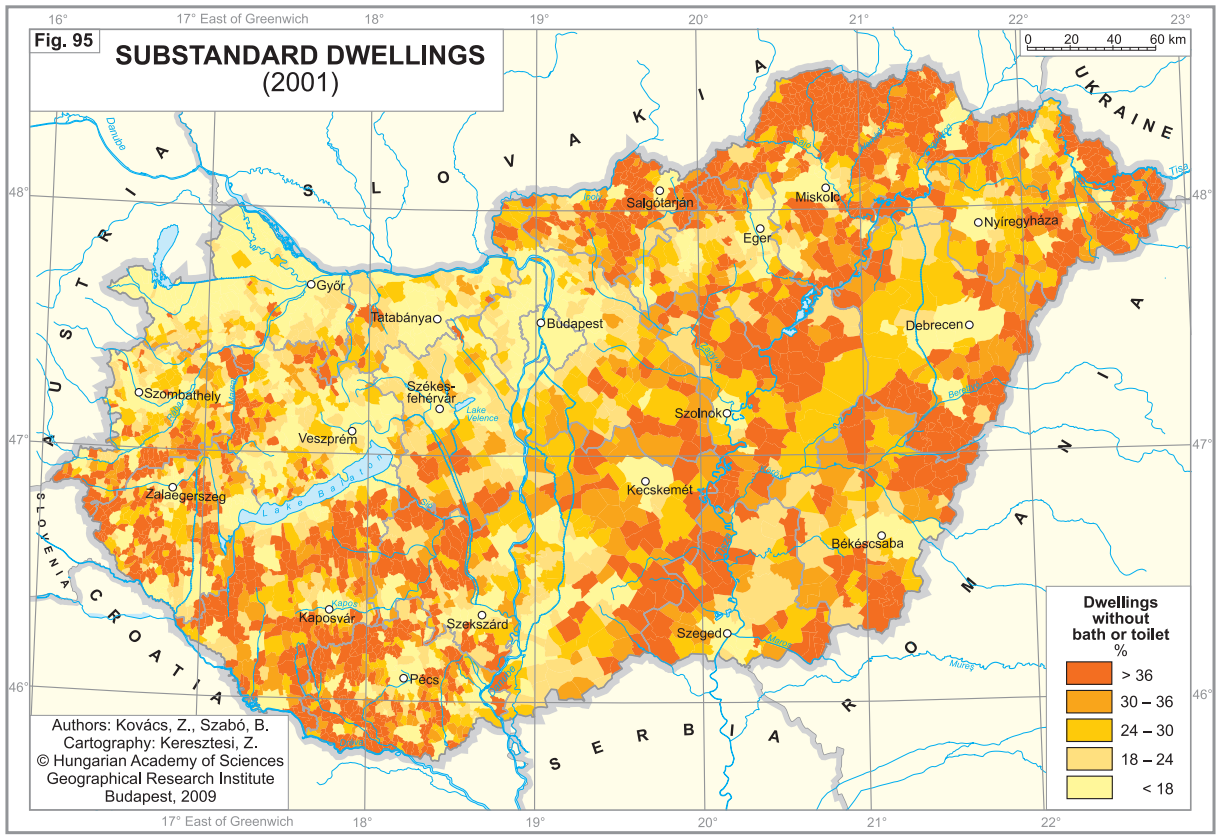


Fig. 95
SUBSTANDARD DWELLINGS (2001)
0 20 40 60 km
Dwellings without bath or toilet %
> 36
30 – 36
24 – 30
18 – 24
< 18
Authors: Kovács, Z., Szabó, B.
Cartography: Keresztesi, Z.
© Hungarian Academy of Sciences
Geographical Research Institute
Budapest, 2009
Salgótarján
Miskolc
Nyíregyháza
Eger
Győr
Tatabánya
Budapest
Debrecen
Székes-fehérvár
Szombathely
Szolnok
Veszprém
Zalaegerszeg
Kecskemét
Békéscsaba
Kaposvár
Szekszárd
Szeged
Pécs
AUSTRIA
SLOVAKIA
UKRAINE
HUNGARY
ROMANIA
SLOVENIA
CROATIA
SERBIA
Danube
Tisza
Drava
Mura
Lake Balaton
Lake Velence
17° East of Greenwich

Table 19. ***Population change in the Budapest Metropolitan Region (BMR, 1990–2007)***

Region	Population 1990	Population 2007	Population change 1990–2007	Number of births	Number of deaths	Natural population change	Migration balance
Budapest	2,016,681	1,696,128	-320,553	277,200	451,425	-174,225	-112,107
Agglomeration	566,961	755,290	188,329	119,695	125,834	-6,139	164,466
BMR	2,583,642	2,451,418	-132,224	396,895	577,259	-180,364	52,359
Central Hungary	2,966,523	2,872,678	-93,845	471,154	675,758	-204,604	110,332

Fig. 96

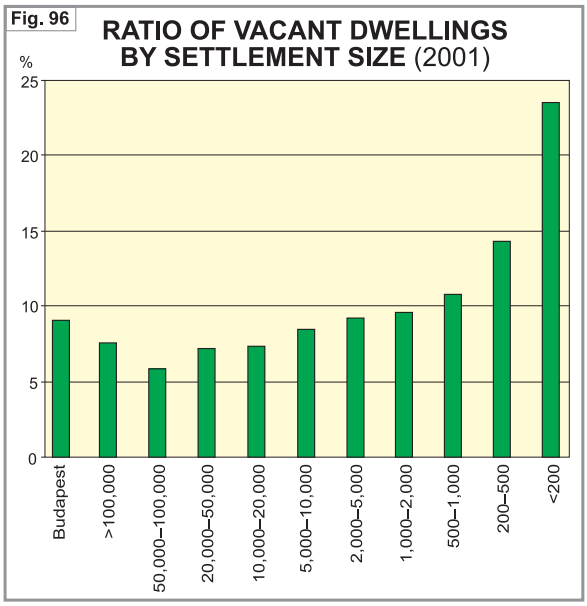
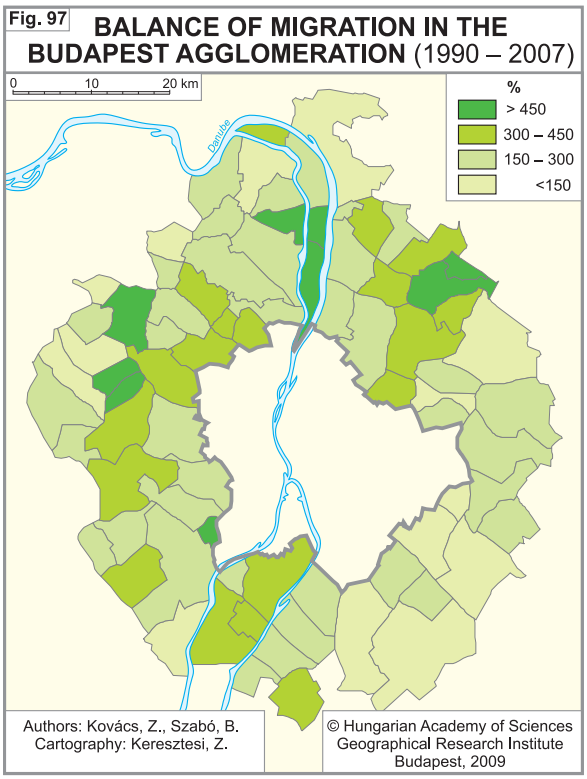


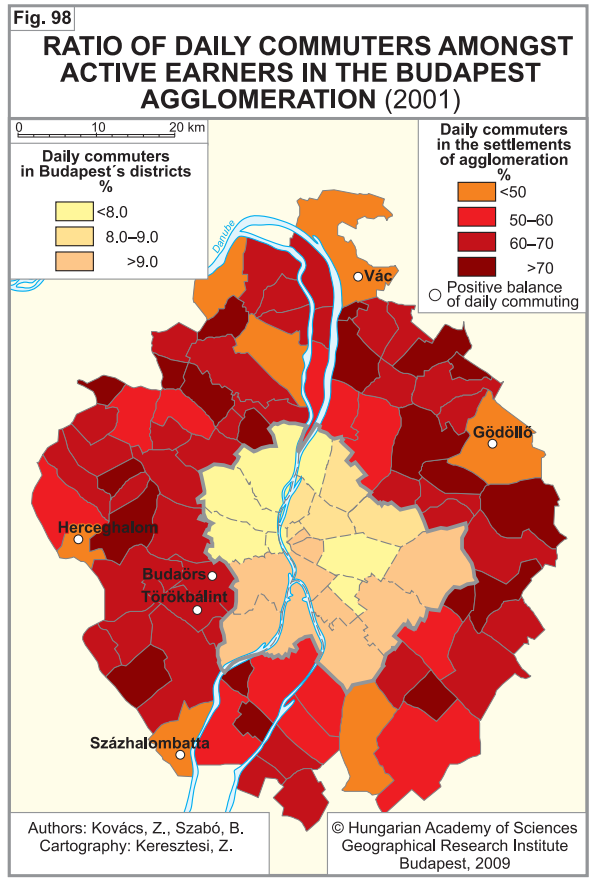
Fig. 97



continuously decreasing (*Table 19*). The main targets for suburban migration have been predominantly rural communities in hilly areas north and west of Budapest, which offer a high quality residential environment in an attractive landscape (*Figure 97*).

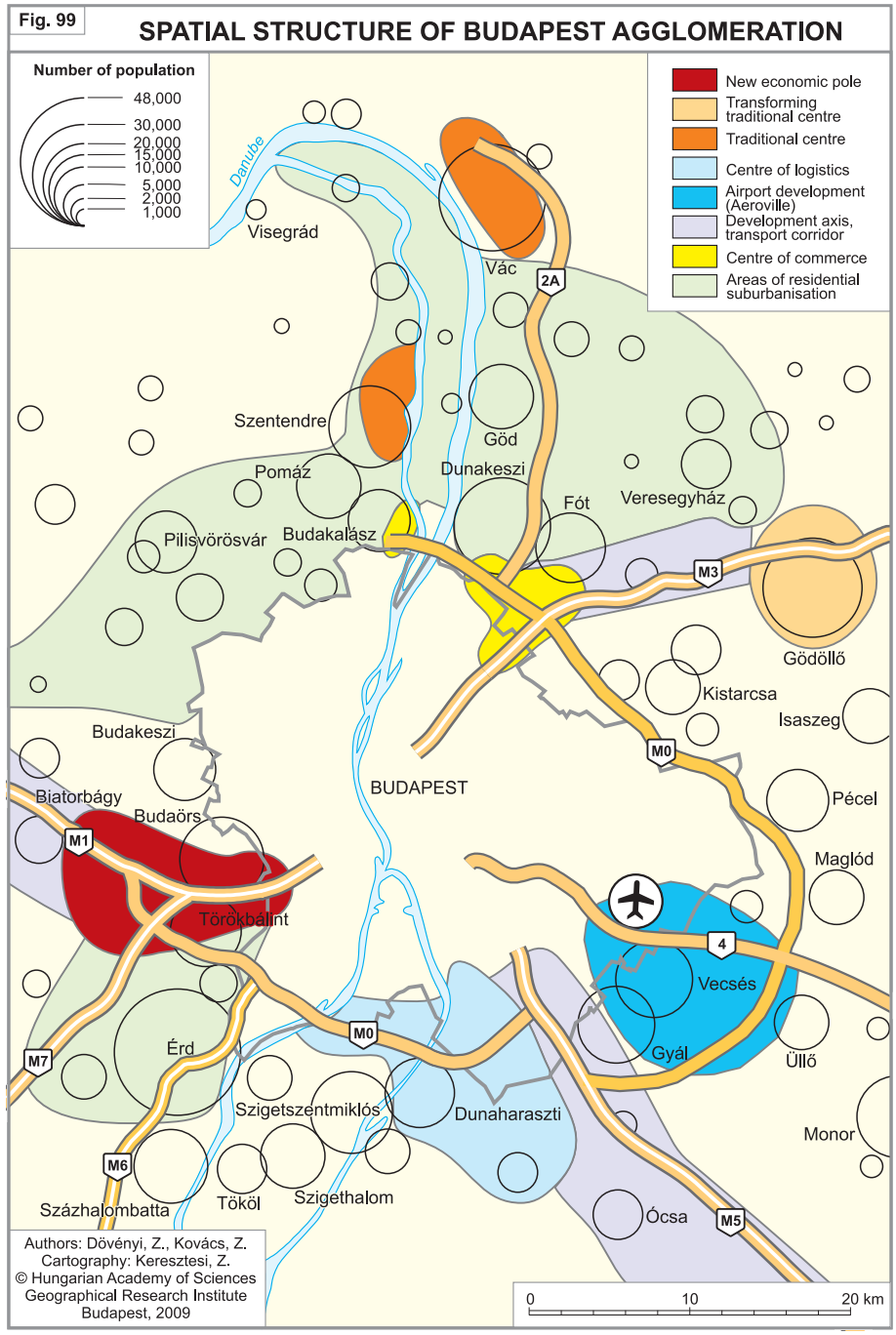
As a consequence of these migration patterns, there is a distinct social polarisation trend in the agglomeration zone: the northern and north-western regions around Budapest provide the upper-middle classes, whereas the southern and eastern regions are dominated by residents from lower socio-economic groups. Alongside residential suburbanisation, increasing deconcentration of economic activities (e.g. offices, retail, and manufacturing) also started in

Fig. 98



the capital's metropolitan region after the mid-1990s. Some of the centres of economic growth around Budapest (e.g. Budaörs and Gödöllő), with their numerous workplaces, attract a mass of employees from the core city *(Figure 98)*. In terms of their physical appearance and functions, some of these locations closely resemble North American edge cities (*Figure 99*).

Fig. 99



ECONOMY

General Characteristics of Economic Development

On the Semi-Periphery of Europe: an Outline of Hungary's Economic History

Whatever indicator one chooses as a basis for the international comparison in the level of economic development, Hungary's position could be assigned somewhere on the borderline between high-income and upper–middle-income countries: 0.16% of the world's population lives here, consuming 0.31% of the total goods produced. The (rather arbitrary) classification by the World Bank for 2008 considered USD 11,905 gross national income per capita (based on the official exchange rate) to be the threshold above which countries belong to the high-income group. The performance of the Hungarian economy (USD 12,810 per capita or USD 17,790 on purchasing power parity) just fulfilled this criterion. Only 15% of the world's population lives in countries richer than that. However, inside Europe, the Hungarian economy belongs to the semi-peripheral zone; in 2008 the purchasing power of GDP per capita in Hungary was only 61.6% of the EU-27 average. The battle to successfully bridge the gap between Hungary and the economically and socially most developed core nations of the continent – a highly important national target for a long time – has been fought from time to time and lost during historical cataclysms.

In the 15th century, the Hungarian Kingdom was a flourishing, strong feudal state, closely following in the footsteps of the most developed countries of South and West Europe. However, after the Age of Discovery, the geographical location of East Central Europe turned to its disadvantage. Located far away from the newly opened shipping routes, it could not benefit from the colonial trade, and subsequent accumulation of capital, thus instead of the emergence of the middle classes in society, the feudal structure was preserved. Hungary's situation was further aggravated by the Ottoman conquest, as a result of which the country became divided into three parts, and during the 16th–17th century it became a battleground for constant conflicts. In the 18th century, when the Ottoman Empire was forced to withdraw from the Carpathian Basin, poverty-stricken Hungary, depopulated over large areas, was annexed to the Austrian Habsburg Empire with a subordinate, peripheral role. At that time, even the very survival of the nation was questionable and the attributes of independent statehood could only be gradually regained. The national awakening that heralded the beginning of the 19th century and the Revolution of 1848 as the zenith of the social and economic reforms, based on Western examples, ended serfdom and abolished the privileges of the nobility. Even though the War of Independence in 1848–49 against the Habsburgs was lost, it provided a solid base for the Austro-Hungarian Compromise of 1867 which became the starting point for rapid modernisation over the next five decades under the dual-Monarchy.

Spectacular economic growth was fuelled by massive inflows of British, French, German and Austrian capital and assisted by the swift increase in the population number and level of education. As a result of the Education Law of 1868, illiteracy became more and more restricted to the older generations. Banks and companies were established one after the other, but agriculture still remained the backbone of the economy. The agricultural sector was dominated by large estates and it was characterised by rapid technological modernisation in practice. It still pro-

vided occupation for 60% of the economically active labour force in 1910 and accounted for 44% of GDP. To process the agricultural products, an extensive food industry developed led by flour mills of international significance; more than half of the country's exports were farming produce and food. Rapid extension of the railways in the mid-19th century facilitated the bulk trade of grain, in the direction of Austria and West Europe. Within a few decades the railway network covered the whole Carpathian Basin. Its radial trunk lines converged on Budapest, the Hungarian capital, at that time experiencing a construction frenzy and industrialisation. The demands of the food industry and railway construction fuelled the emergence of different branches of the engineering industry, as well as coal mining and steel manufacturing. By 1910, industry employed 18% of wage-earners, and provided more than 25% of GDP. Immediately before World War I, in Hungary continuous large-scale construction projects were launched, and the country was characterised by a rapid spread and application of innovations. It was still lagging behind the leading states of Western Europe (the Hungarian GDP per capita was about 58–60% of the West European average), but it was well ahead of the South and East European countries.

After World War I, the Austro-Hungarian Monarchy collapsed, the customs and monetary union which provided a fertile market for economic development was abolished, and the threads of the geographical division of labour were severed. Due to the Treaty of Trianon, Hungary lost 71.4% of its former area, 63.5% of its population and became one of the smallest and weakest successor states of the Monarchy. Most of its natural endowments (mineral resources and forests) had been allotted to the neighbouring countries, as well as the transversal railway lines and cities that would have been able to counterbalance Budapest's dominant position in the urban network. After the painful adjustment to the new conditions and the economic consolidation implemented by foreign loans, the Great Depression of 1929–1933 brought repeated dramatic declines. Under these circumstances, the fact that the Hungarian economy could retain its relatively advanced position somewhere in the middle of the rank of European countries could be considered a success. The structure of the economy and the proportion occupied by individual sectors did not change much: considerable development only occurred in the manufacture of consumer goods, in order to substitute imports, mainly in the textile and clothing industries. By the end of the 1930s more than half of exports were directed to the German Empire, and in-line with German demands, the war munitions industry enjoyed priority.

During World War II, Hungary suffered a loss of about one million people from battleground conflicts and the Nazi holocaust. Systematic plunder first by the German troops, then by the Soviet Red Army, aggravated the losses caused by the destruction of production equipment. The majority of machines which survived the war were requisitioned and removed from the country. Industry lost more than half of its fixed assets, whilst transport and agriculture incurred similar loss. In 1946, the economic performance was equal to its level of 50 years prior, and the production level would only return to that of 1942 as late as 1952.

After World War II, Hungary fell into the sphere of influence of the Soviet Union and was forced to introduce a command economy. Nationalisation of the banks, industry and trade which had already begun during the post-war reconstruction period was completed by 1950. Collectivisation of agriculture ended in 1961; in this sector the socialist 'kolkhoz' type of collective farms prevailed. Small private enterprises, mainly offering services, had only marginal role in the economy until the 1980s.

In the centralised planned economy state-owned companies were prescribed what and how much to produce. The reforms of 1968 loosened the highly rigorous regulations, providing much greater freedom to companies, giving way to market forces. However, they did not change ownership relations.

Economic strategy – especially in the 1950s and 60s – was characterised by a large-scale accumulation and the pursuit of autarchy, mainly at the expense of living standards. More than half of investment was directed into the manufacturing industry, while developments in services, infrastructure and agriculture were neglected. Large state investments supported the establishment of war-driven heavy industry – mining, metallurgy and certain branches of engineering – although these were not at all in line with Hungary's available natural resources. *Hungary became strongly isolated from the processes*

governing the world economy. External trade links tied the country to the Soviet Union as a key partner. Exports included agricultural produce, food and machinery, while raw materials and energy sources were imported. In the 1970s, Hungary's economy also gradually opened up to the western part of Europe. The rise in fuel prices led, however, to a worsening of the country's terms of trade, with an ensuing budget deficit and a slowdown in economic growth.

The socialist era, which ultimately led into a dead-end, brought deep social changes: forced urbanisation and improved education and health care systems. The macroeconomic structure reflected the emergence of an industrial society, in which by 1990 agriculture employed only 15% of the active labour force, whilst at the same time the proportion of industry, building and construction reached 38%. Yet the country was not able to keep pace with the technological and communications revolution that had transformed the world economy. The apparent successes brought about through extensive development were soon followed by a decline. By 1990, the economic performance of Hungary reached only 50% – or according to other estimations merely 40% – of the level of the 12 most developed European countries, and was even lagging behind the South European countries which were already part of European integration. This, however, was still not the nadir. During the recession which followed the collapse of the communist regime and the peaceful economic and social transition in 1990, the country's GDP declined by more than 20% and the earlier peak would only be reached again in 2000. Although the recession in Hungary ended in 1994, relatively quickly compared to the other countries of the East Central European region, the decade further widened the economic gap separating Hungary from the western half of the continent. Hungarian society, having anticipated not only national independence and political democracy, but a tangible increase in living standards after the change of regime, was bound to be disappointed as transition required painful sacrifice.

Transition to a Market Economy: Privatisation and Capital Influx

A temporary recession during the transition and rapid changes in ownership structures were unavoidable consequences. This decline was worsened by the collapse of the Soviet Union and the abolition of Comecon. Hungarian industry and agriculture lost their most important (and protected) markets; more than half of the country's exports went to these countries in the 1980s. A large number of factories went bankrupt and more than one million jobs were lost. Unemployment – a concept that was virtually unknown during the socialist era – was sky rocketing. Social differences and spatial disparities suddenly increased. Inflation peaked at 35% in 1991 and economic decline hit a low in 1993.

The reorientation of international trading relationships was vital for opening up the Hungarian economy towards the European Union, necessitating the deepening of institutional relationships. In 1991, Hungary signed an association agreement with the European Community, the so-called 'European Agreement' that came into force in 1994 and was aimed at phasing out tariffs and quotas hindering trade. Already by then, half of Hungarian foreign trade was taking place with the EU countries. This rate increased rapidly to the extent that nowadays *about four-fifths of the country's exports are destined for, and 68% of its import arrive from the enlarged European Union*. The preconditions set by the EU for full membership were a stable parliamentary democracy, a functioning market economy, and the acceptance of *acquis communautaire* (community law). The regime change and the establishment of the institutions of the parliamentary system were completed in the period 1989–1990, whilst full transition to a market economy based on the principles of private ownership took longer, and was completed only by 2004, the year of Hungary's accession to the European Union. Simultaneous steps aimed at European integration and adjustment to the realities of globalisation required the rapid modernisation of production, which would have been impossi-

ble without *privatisation* and the *inflow of foreign capital*. The state of Hungary's economy today is a result of these interwoven processes.

The abolition of state ownership and the privatisation of public property during the market economy transition had to be carried out without any previous experience and in a rather short time. The period of so-called 'spontaneous privatisation' in Hungary started in 1987, without any legal regulation, when the former managers of state-owned companies – including the representatives of the communist party – were able to acquire remarkable wealth. Spontaneous privatisation could not, however, result in the modernisation of these rather deteriorated and obsolete assets, nor a significant change in management style, thus the majority of these companies went bankrupt and/or became the target for foreign acquisition.

After 1990, state property was usually sold to foreign investors by tender, controlled by the necessary laws and regulations, in accordance with the rules of the market economy. Compensation vouchers were given to former owners, whose assets were originally seized by the communist regime, but they could play only a modest role mainly in rearranging agrarian property relations. The quick sale of state-owned assets – often at prices below market value – was compelled by the large amount of government debt inherited from the previous system, which exceeded 90% of GDP at the beginning of the 1990s. Revenues raised from the sale of public property should have been spent on decreasing debt levels, but successive governments were reluctant to fulfill this obligation. The role of the state as an owner of assets shrank to an even smaller proportion than it is common in West European market economies. Apart from retaining minority shares in certain firms, only some companies providing basic public services (such as the nuclear power station, the national electricity grid, the railway and the postal service) remained in state ownership. Nevertheless, government gross debt, accumulated as a result of the ongoing budget deficit exceeded 70% of GDP in 2008 and stands close to 83% by mid-2009 with the most recent increase being mainly due to the shrinking output of the economy, the decline in the recession-hit manufacturing. This is despite debt levels having shown a previous temporary decrease, when in 2001 it fell to 52% of GDP. Indebtedness is the major obstacle that hinders Hungary's accession to the Eurozone. *Financing external debt became an enormous burden for the Hungarian economy, and this has been further aggravated by the recent global financial crisis*. Interest payments from public finances in order to service this debt, amounted to HUF 1,100 billion in 2007, or 4% of GDP.

In 1989, Hungary was the first among the East-Central European countries to open its doors to foreign direct investment, which greatly contributed to technological modernisation and increasing productivity. In the first part of the 1990s, about half the investments were associated with privatisation. The aim of these transactions was the acquisition of valuable companies in the manufacturing sector and penetration into the local market. The main attraction of greenfield investments at that time was the abundance of relatively cheap labour. Later, more and more greenfield investment was directed towards the export-oriented sectors with their higher value-added element (automotive industry, electronic engineering, precision engineering and electronics) or in the service sector, and were connected to remarkable technological transfer too. Numerous multinational companies (e.g. General Electric, Nokia and Ericsson) even founded R&D units in Hungary. Besides the direct benefits provided by the government for prospective investors, the existing infrastructure (motorways and industrial parks), a favourable geographic location (for logistics), a strong work ethic and contacts hitherto existing also proved to be factors of attraction. All of this was true mainly for Budapest and its environs, and the western region of the country, where the rate of unemployment is low, and there has been a massive demand for skilled workers.

The total inward FDI stock that has flowed into the country since the beginning of the economic transition exceeded EUR 70 billion by June 2008 and is increasing by about EUR 4 billion annually. 77% of the operating capital invested in Hungary derives from the European Union, of which the biggest investor is Germany. The service sector was the beneficiary of over 60% of foreign investment and more than a third of it was invested in the manufacturing industry. Companies registered in Hungary also invested a significant amount of capital in the regions East Central Europe and South-East Europe after the turn of the millennium. Among the notably active companies aspiring to become regional multinationals, are MOL (oil and gas industry) and OTP Bank, but mention should also be made of the pharmaceutical sector

(Richter Gedeon), telecommunications (Magyar Telekom) and hotel chains as well. Outward FDI stock in 2007 exceeded EUR 18 billion.

In contrast with the 1990s – when the influx of capital greatly improved Hungary's balance of payments – today the majority of FDI stems from the re-invested profits of Hungarian shareholdings. A new tendency has developed for foreign investors to transfer abroad most of the profits acquired in Hungary, in the form of dividends. Besides the interest burden of the national debt, this is *the reason why the value of GNI (Gross National Income) is lagging further and further behind GDP (in 2007 by 7.7%)*.

Main Features of the Reshaped Economic Structure

During the transition to market economy, a large number of businesses were established in Hungary and presently there are about 1.2 million enterprises. Their diversification in size shows the dual structure of the economy. Most of them (57%) are private ventures and 80% of them operate in the tertiary sector. The number of companies with foreign shareholders (where more than 10% of the company is in foreign ownership) was 25,800 at the beginning of 2007. They employ more than 600,000 workers (this is one quarter of the total number of jobs in the business sector) and produce more than four fifths of exports. Their suppliers include several domestic companies. There are around 800 large companies in Hungary that employ more than 250 people. Small and medium-size enterprises – that manufacture mainly for the domestic market – play a significant role in the employment market however, their profitability lags far behind the large companies.

In the last two decades the macroeconomic structure has changed significantly, so that today agriculture contributes only 4% of GDP, industry, building and construction contributes 30%, while the service sector is responsible for 66%. During the transition period the previously underdeveloped tertiary sector progressed the most dynamically. Almost all commercial banks and the majority of hypermarkets and shopping malls are owned by foreign entities. These establishments are the landmarks of modern globalisation all over the country, and have changed patterns of consumption, introducing new financial and commercial cultures. The formerly neglected telecommunications network was also expanded and improved to meet west European standards, with the help of foreign investment.

The output of the manufacturing industry more than doubled compared to its 1989 value, its structure has undergone a remarkable modernisation and the leading position of export oriented machine industry has strengthened in every respect. With the construction of new factories by large multinational automotive companies (GM-Opel, VW-Audi and Suzuki) the local car industry was established and became a main pillar for exports. Hungary's fundamental integration into the production processes of these multinational firms has resulted in a strong dependence on international market conditions and increased vulnerability during recessionary periods. The production of household appliances, consumer electronics and communication engineering units, electronic componentry and precision instruments, have also attracted large investments. In the chemical industry, rubber and plastic manufacturing has expanded considerably. The traditionally strong pharmaceutical sector attracted investors by preserving its competitiveness in the East European markets.

There is another side to the success story: the decline or disappearance of whole companies and even industry sectors, as a result of economic transition and increased competition. All but one of the deep shaft coalmines were closed, bauxite mining shrank to a fraction of its previous size, alumina production and non-ferrous metallurgy disappeared completely. Out of the three integrated iron and steel plants in the country, only Dunaferr has been able to survive, by constantly improving its technology and enlarging its product range. The textile and shoe industries were moved to other East European and Asian countries that had offered a plentiful supply of cheap labour, thus the relative importance of these

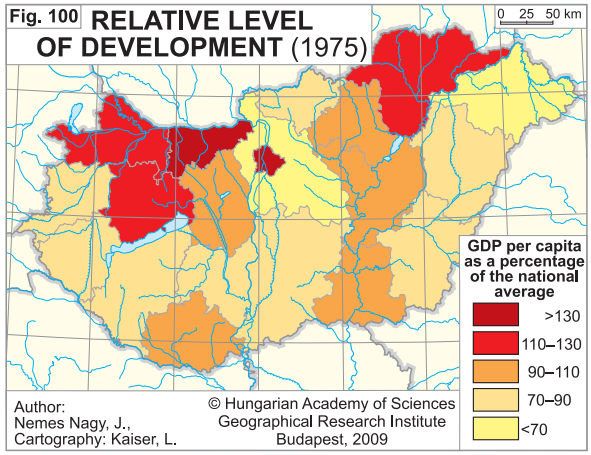
branches sharply decreased. Food processing experienced a decline in the number of its production facilities, while the ever changing product range reflected the adjustment to the labour division conceptions of multinational companies.

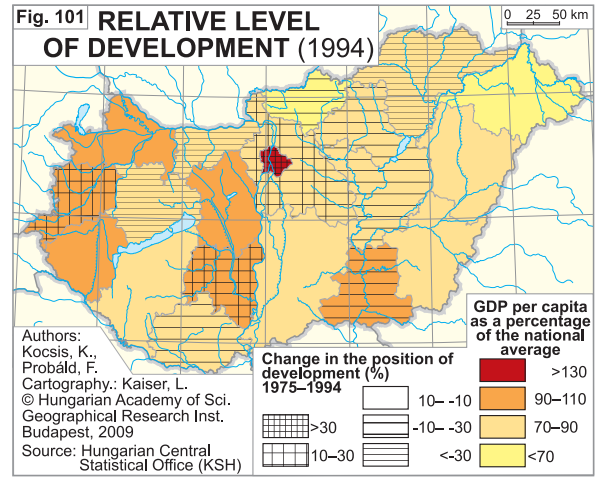
The heaviest toll of the transition period was suffered by agriculture, notably there has been a sharp decline in the sector's output. During the period 1990–94, it dropped to two thirds of its previous level, and productivity has been unable to approach its levels prior to 1989. Compensation, the dissolution of cooperatives and the privatisation of assets at the end of the 1990s, allowed town dwellers without any interest in agriculture, to buy pieces of land, whilst at the same time many workers in cooperatives and state farms lost their jobs and sank into poverty. With the ownership and cultivation of land now largely divided, a land-leasing system spread. Today, large enterprises cultivate about half the arable land, which are the successors of the former cooperative farms. The majority of private farms – situated at the opposite end of the scale – are so small that they can only provide some additional income or a second, part-time job. The proportion of viable private farms in agriculture is far from the ideal. The ageing of the agricultural population and the lack of skills are just a part of the problem. The disconnect between producers and (to a great extent foreign-owned) food processing plants lead to further difficulties: smallholders have no strong collective bodies to represent their common interests, so they are in a disadvantaged position when in negotiations with wholesalers, international retail chains and the food industry in general, when selling their products. While in the 1980s around one quarter of Hungarian exports were agricultural and food products, today this number fluctuates around the 6% mark, while agricultural imports are constantly increasing.

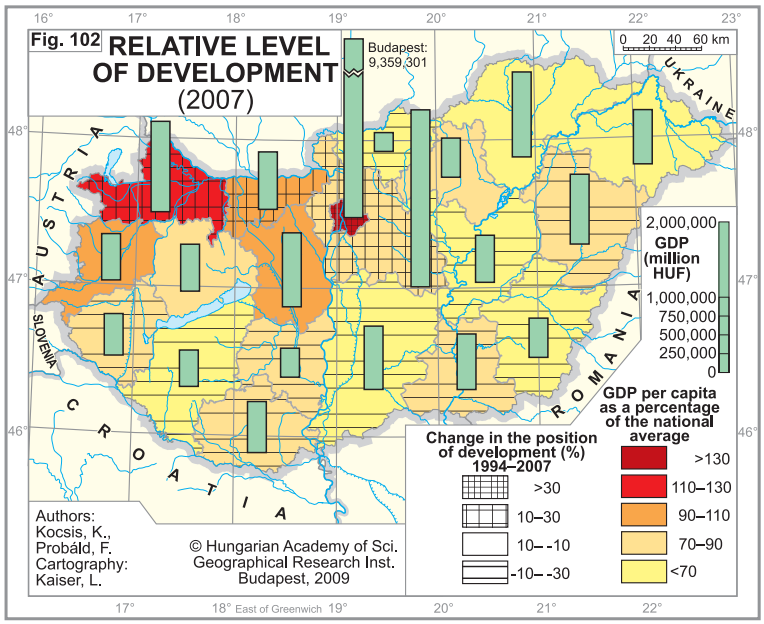
Regional Processes

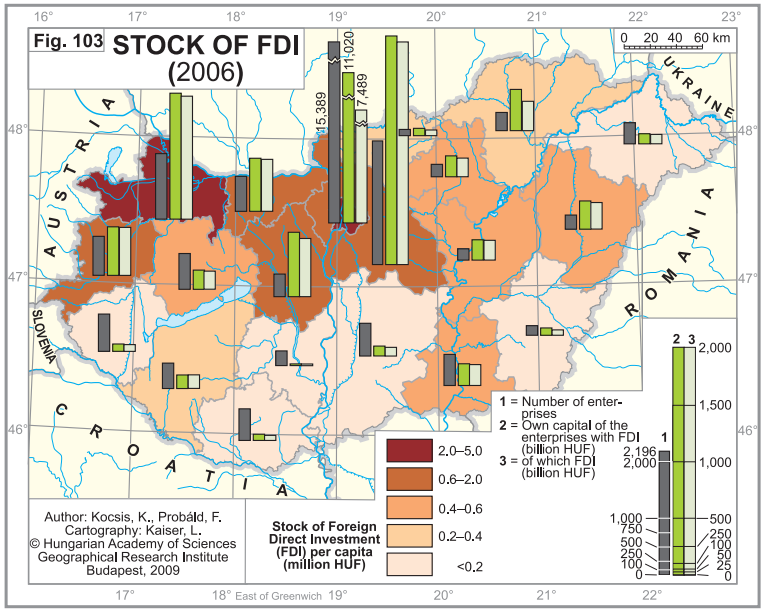
The market economy transition increased social inequalities. The average income of the upper socio-economic groups (the top 10% of the population) is now about six times higher than that of the poorest 10%, which is a striking disparity even under the spotlight of international comparison. In the early 1990s, regional disparities sharply increased and subsequently settled, showing similar trends to those visible in income disparities. The emerging new socio-economic spatial pattern largely reflects the impact of international trends and ties.

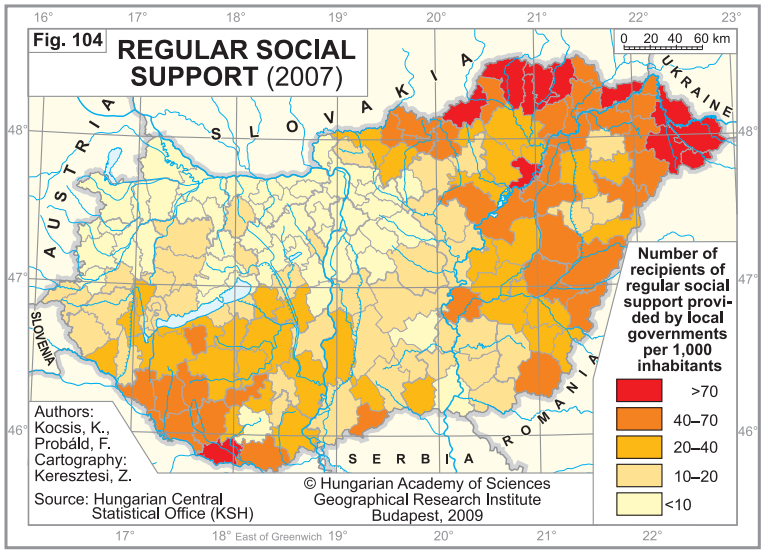
Out of Hungary's seven 'NUTS 2' statistical regions, Central Hungary (which incorporates Budapest) stands out, as the GDP per capita exceeds the national average by 64.3%





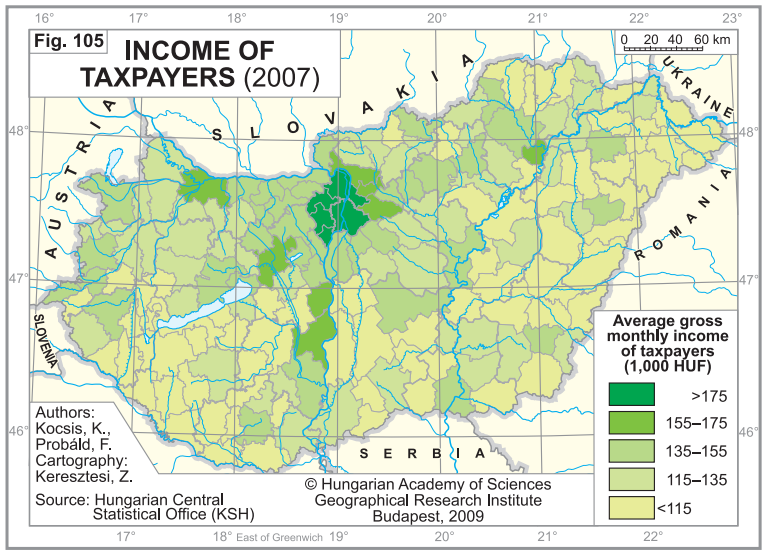


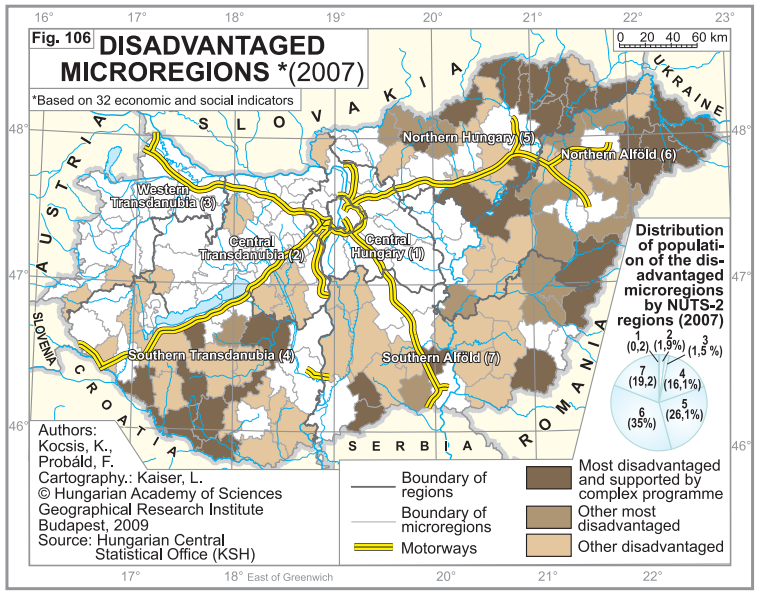


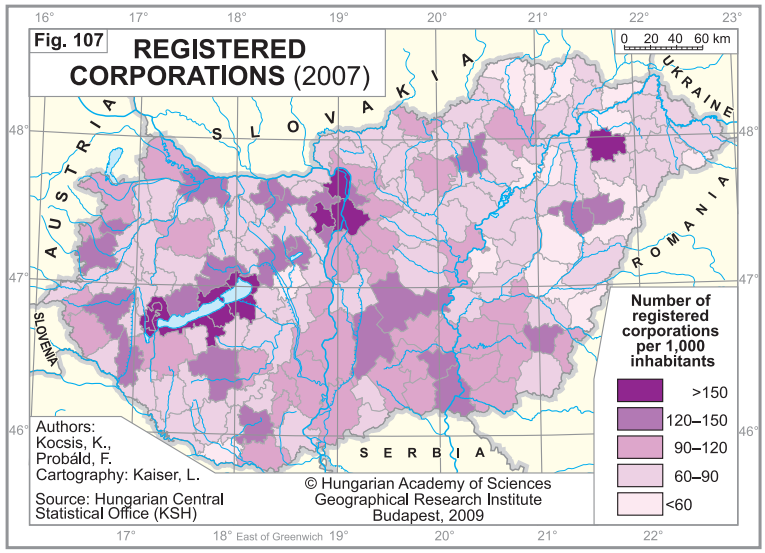


(in 2007). Its position is even higher when considering the number of enterprises and the amount of FDI per 1,000 persons. This is the sole region of the country where economic performance exceeds the average of the 27 EU countries. The agglomeration of the capital, with more than 2 million inhabitants is the most competitive ensemble of settlements, even on an international scale. It is a centre for administration, services and innovation, as well as a logistic hub. Its higher education institutions educate almost half the total number of students in tertiary education. The dichotomy of Budapest versus the rest of the country is one of the enduring and strengthening features of Hungary's spatial structure. Of the other regions, only West Transdanubia can boast economic performance which is slightly above the national average, closely followed by the Central Transdanubian region. The weakest regions by economic performance, are located in the eastern part of the country where GDP per capita does not even reach two thirds of the national average. It is therefore justified to conclude that the old east–west dichotomy, as a spatial characteristic, continues to exist.

The change of regime influenced the economic development of Hungary's counties (at 'NUTS 3' level) rather differently and the last three decades have significantly realigned their rank (*figures 100 through 102*). In the 1970s, the counties with mining and heavy industry centres showed the best economic performance, after Budapest. Among them, the heaviest tolls exacted by the economic transition were suffered by the counties located in the northern part of the country, and especially the county of Borsod-Abaúj-Zemplén. Due to their geographical location, good accessibility and pre-existing ties, the north-western counties – Győr-Moson-Sopron and



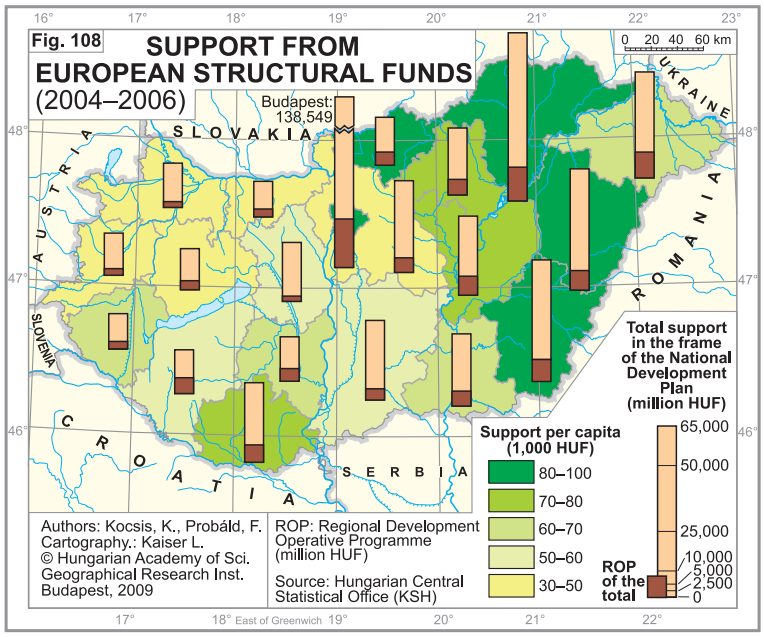




Vas – became popular targets for foreign direct investment, following closely in the footsteps of the Hungarian capital. Their rapid connections to international networks facilitating the swift movement of their exports to the core European markets, and their traditional receptiveness to innovation have made them the winners of the last two decades (*Figure 103*).

On the basis of the 174 microregions ('NUTS 4' or 'LAU 1' level, *figures 104 through 107*) we can receive an even more precise and complicated picture. Within the relatively underdeveloped areas, microregions have a relatively better ranking whose seats are towns possessing a significant quaternary economic sector, and are well connected to globalisation networks. These microregions are mainly the large higher education centres (Debrecen, Szeged, Miskolc and Pécs). Some microregions have become famous for their tourism, showing the importance of locality and local resources. These are concentrated in the holiday regions around Lake Balaton. The most disadvantaged microregions are in the north-eastern counties and in South Transdanubia, forming large, continuous belts. The settlement network of these areas consists of small villages without large, central towns that could provide ample job opportunities. They also often stand out due to their – largely unskilled – Roma population. Because of long term unemployment and striking poverty, the majority of the inhabitants of these microregions are regularly reliant on social benefits.

The reduction of sharp differences that have arisen from the market economy transition, and an improvement to the situation of regions that are lagging behind, poses a long-term challenge for regional development policy. The magnitude of resources awarded



from EU Structural Funds since 2004 – in particular if we consider the spatial distribution of the areas where they were deployed on winning projects – is far from enough to cure the problem. Less than 20% of the EU support awarded (HUF 670 billion) that was deployed within the framework of the National Development Plan between 2004 and 2006, was spent on projects within the Regional Operative Programs (*Figure 108*).

Reserves of Development for the Future

Following two centuries of fruitless effort directed at closing the gap between Hungary and the European continent's core area, the accession to the European Union has improved the external conditions that influence the likelihood of achieving this target, although it still does not seem to be any closer. In the interests of enhancing success, internal reserves should be mobilised and the country's natural resources should be exploited in a more purposeful manner. From the broad range of potential options to increase the country's competitiveness, only a few are listed below:

– The rate of economically active working age population in Hungary is one of the lowest in Europe; only 57% of the 16–64 age-group (2008). Creating new jobs and increasing the economic participation of the population can be an important factor in increasing the country's GDP.

– The rate of R&D expenditure is rather low, barely reaching 1% of GDP. A considerable increase could accelerate the development of a knowledge-based economy, enlarge the scale of activities with a high value-added component, and encourage the flow of foreign capital into these sectors. Large companies engaged in mass production need to improve the training of skilled workers, enhancing the mobility of the population by an improvement in conditions for migration within the country.

– Agricultural production is the only sector in Hungary which can rely on a plentiful supply of natural resources. The significance of this fact will gather pace in the long term, as demand for agricultural products in world markets increases, be it for food or bio-fuel crops. However, to exploit these outstanding features the sector needs a product palette which is able to flexibly adjust to market demands, farms of a viable size and an appropriate ownership structure.

– The new, post-Trianon borders scythed through the connections that gave rise to regional labour divisions, and as a result most of the border regions became disadvantaged. With the enlargement of the Schengen Zone, Hungary's borders need no longer act as a strict separation between countries. Thus new forms of economic development can arise through cross-border co-operation.

– The location of Budapest, in the heart of the Carpathian Basin, along the main route from

the western regions of the continent to South East-Europe, provides a solid basis upon which to strengthen its 'gateway' function and to become the first metropolis from the East Central European region that joins the outer circle of global cities.

The lessons to be drawn from the achievements (and failures) of economic history over the last two decades are that in order to take advantage of the existing opportunities, particularly those afforded by EU membership, social consensus concerning national goals, as well as a responsible and consistent governmental economic policy would be required. Last but not least, the future success of Hungary is inseparable from the ability of the whole of the European Union to respond the challenges of the 21st century.

Agriculture

Following the dissolution of the Austro-Hungarian Monarchy and the territorial annexations imposed upon Hungary by the Treaty of Trianon, the new international borders severed centuries-old regional economic relations within the Carpathian Basin. Agricultural production decreased in the new border zones, caused by the partial emigration of the population, from a region that, in general, became increasingly isolated. Hungary was left with a predominantly agricultural economy after the Treaty of Trianon. As a result, the country's economy has, for the past 90 years, struggled with the necessity to offset its economic imbalance, time and again managing to cope with agricultural overproduction as a significant part of Hungary's agricultural produce was exported to the German and Austrian markets between 1930–1944, then to the Soviet-dominated Comecon trading area in the period 1960–1985, and finally to West Europe after 1990.

The objective of the new Common Agricultural Policy (CAP) of the European Union is precisely to avoid over-farming, by better adjusting land use with a view to its ecological endowments, enabling regions to specialise and distribute activities among themselves. Instead of a narrow 'sectoral' view, such an approach provides more opportunity for a complex regional policy, with the aim of ensuring sustainable development for rural societies.

The share of agriculture and food production has increased to in excess of 7% within the national export output (2007), while imports have grown to 4.7%, thus agrarian foreign trade had a positive balance of EUR 1,599 million (*Table 20*). The commodity contents of exports predominantly consisted of cereals, meat products, as well as vegetable and fruit products, together providing 47% of total agricultural exports. The predominance of cereals was due to the fact that the good yields of previous years helped accumulate a major surplus, thus, 75% of wheat and 96% of maize was sold to other EU member states. Hungary's biggest agricultural export markets are Germany (14.3%), Italy (11%) and Romania (11%), while 5% of agricultural and food processing output is sold outside Europe.

Table 20. ***Commodity pattern of Hungarian agricultural foreign trade (million EUR)***

Commodity groups	Export			Import			Balance		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Livestock, animal products	923	927	1,076	554	595	656	369	332	420
Plant products	986	1,145	1,944	530	562	696	456	583	1,248
Animal fats, plant oils and wax	116	120	138	111	104	139	5	16	-1
Food products, beverages and tobacco	1,298	1,483	1,649	1,212	1,420	1,718	86	63	-69
Total	**3,324**	**3,675**	**4,807**	**2,408**	**2,680**	**3,209**	**916**	**995**	**1,599**

Source: Hungarian Central Statistical Office (www.ksh.hu)

The Position of Agriculture in the National Economy

The growth of Hungarian agriculture and the food industry was most dynamic in the early 1970s, stimulated by an increasing export demand from the Comecon area, and a higher degree of domestic consumption. During the following one and a half decades, the growth rate slowed, but the balance between production and consumption remained stable, as market conditions barely changed (*Table 21*). Gross Domestic Product (GDP) grew during the market

Table 21. ***Annual change in agricultural gross production (%)***

Year	Crop production	Animal husbandry	Total agricultural production
1971–1975	5.6	3.5	**4.6**
1976–1980	1.7	3.4	**2.5**
1981–1985	0.4	1.0	**0.7**
1986–1990	- 1.0	0.3	**- 0.4**
1991–1995	-4.7	-8.1	**-6.5**
1996–2000	-1.5	0.8	**-1.0**
2001–2005	13.3	-2.9	**4.3**

Source: Hungarian Central Statistical Office (www.ksh.hu)

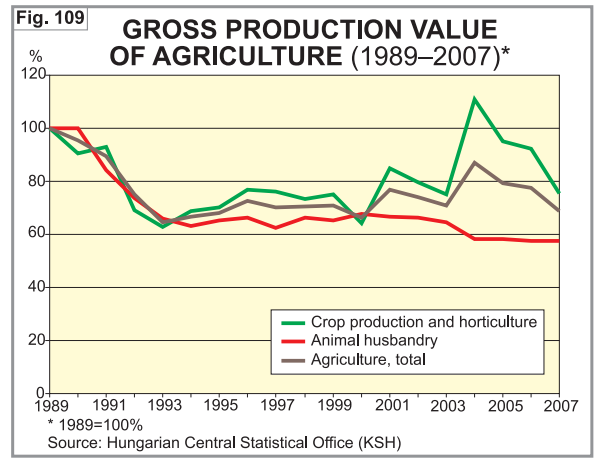
Table 22. ***Ratio of agriculture in GDP***

Year	National economy, total	Proportion of agriculture, hunting, forestry and fishing	
	million HUF	million HUF	% of total
1985	1,033,658	166,664	16.1
1990	2,089,313	261,236	12.5
1995	5,561,900	347,400	5.2
2000	11,566,473	623,749	5.4
2005	18,838,265	801,125	4.2
2007	21,795,210	878,279	4.0

Remark: At current basic prices, million HUF
Source: Hungarian Central Statistical Office (www.ksh.hu)

economy transition years, chiefly due to foreign direct investment (FDI) in industry and the tertiary sector. Consequently, the share of agriculture within GDP declined (*Table 22*). In the year of the regime change (1989) agriculture was responsible for 13.7% of GDP, and provided 22.8% of export revenues, whilst employing 17.4% of wage-earners. By 2007, the same figures had declined to 4%, 7% and 4.7% respectively. Such declines were essentially caused by the restructuring of the national economy. After a downturn in the early 1990s, gross agricultural production stabilised between 1995 and 1999, followed by a return to growth, but showing extreme fluctuation (mainly in the crop production sector). Output has since fallen back to the level of the 1990s (*Figure 109*).

Fig. 109



Land Use Structure

The proportion of the country's productive land (agricultural land, forest, reed and fishponds) decreased from 94% to 83.5% over the past 100 years, primarily as a result of urbanisation (urban growth, infrastructure development, etc.). The share of the agricultural land area (encompassing arable land, gardens, vineyards, orchards, meadows and pastures) has also decreased, while afforestation has accelerated.

Land use follows the spatial pattern imposed by the natural conditions (*Figure 110*): forested area is predominant in mountains, but also widespread in hilly terrain and on poor quality, sandy soils. Arable land extends over more than 70% of the lowlands (Alföld, Kisalföld and Mezőföld) and the gently sloping hills (e.g. Outer Somogy and the Tolna Hills).

The most fertile cropland is cultivated in the Kisalföld, Mezőföld, Bácska, Békés and Hajdúság regions. Of the more intensive land uses (vineyards, orchards and gardens), the historic wine-growing regions, the vineyards and orchards of the Danube–Tisza Interfluve as well as the orchards of Szabolcs-Szatmár-Bereg County are the most characteristic and well known landscapes. This land use type includes suburban gardens found in built-up areas. Grassland (meadow and pasture) is most extensive in the Transdanubian Hills, on the slopes of the Cserhát and Cserehát Hills, and on the wet

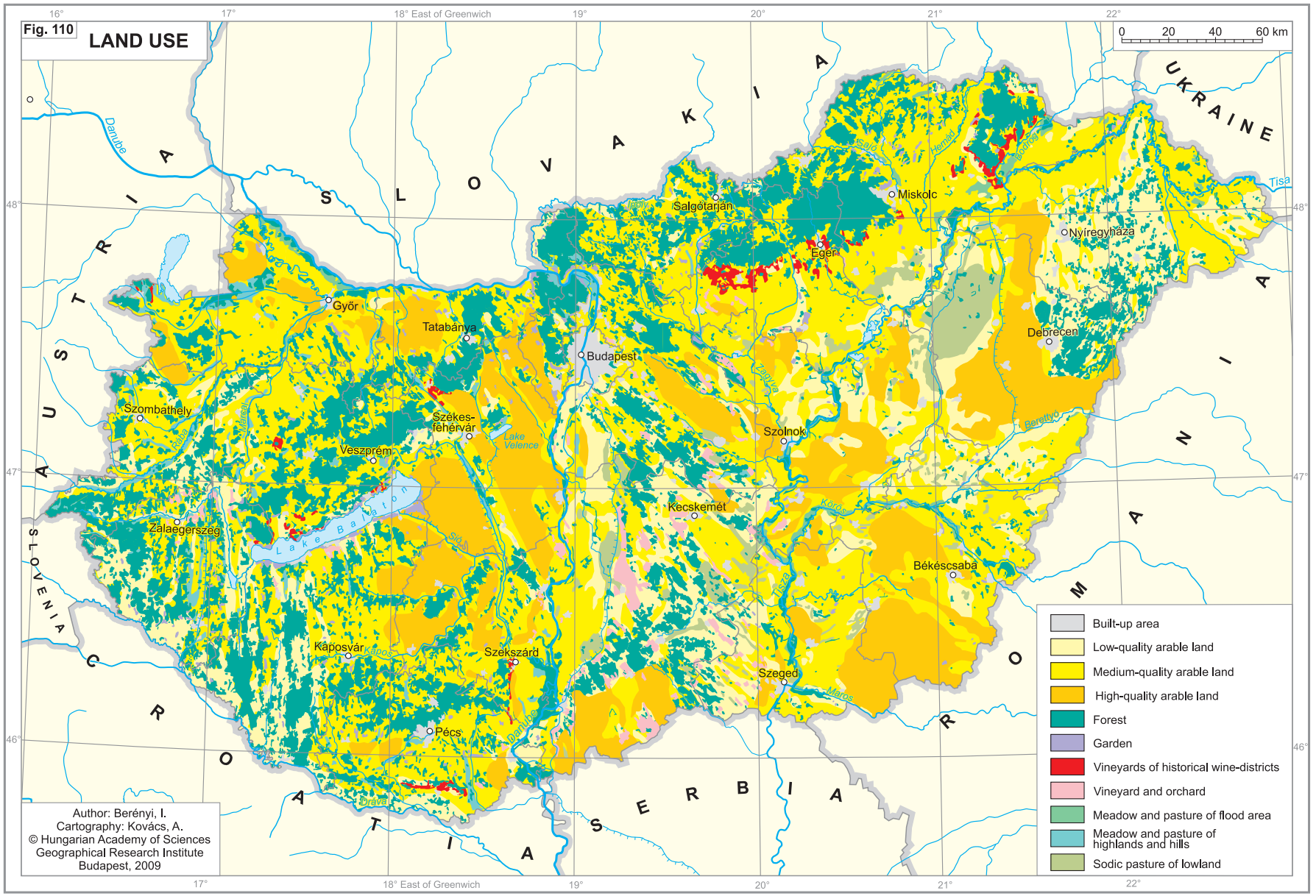


Fig. 110
LAND USE
0 20 40 60 km
16° 17° 18° East of Greenwich 19° 20° 21° 22°
48° 47° 46°
AUSTRIA
SLOVAKIA
UKRAINE
HUNGARY
SLOVENIA
CROATIA
SERBIA
ROMANIA
Danube
Tisa
Ipoly
Sajó
Hernád
Bodrog
Rába
Marcal
Zala
Zalavíz
Sió
Berettyó
Körös
Maros
Lake Balaton
Lake Velence
Győr
Tatabánya
Budapest
Salgótarján
Miskolc
Nyíregyháza
Eger
Debrecen
Szombathely
Székes-fehérvár
Veszprém
Szolnok
Kecskemét
Zalaegerszeg
Békéscsaba
Kaposvár
Szekszárd
Szeged
Pécs
Built-up area
Low-quality arable land
Medium-quality arable land
High-quality arable land
Forest
Garden
Vineyards of historical wine-districts
Vineyard and orchard
Meadow and pasture of flood area
Meadow and pasture of highlands and hills
Sodic pasture of lowland
Author: Berényi, I.
Cartography: Kovács, A.
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Geographical Research Institute
Budapest, 2009

Table 23. ***Land use categories (1960–2008)***

Year	Arable land	Garden	Orchard	Vineyard	Grassland	Agricultural land area	Forest	Reed	Fishpond	Productive land	Uncultivated land	Total
	area											
	Thousand hectares											
1960	5,309.8	107.5	82.3	203.6	1,437.9	**7,141.1**	1,306.2	26.1	..	8,473.4	829.6	**9,303**
1970	5,046.2	146.3	171.6	229.7	1,281.3	**6,875.1**	1,470.7	32.3	..	8,378.1	924.9	**9,303**
1980	4,734.7	291.4	138.4	167.8	1,294.2	**6,626.5**	1,610.3	37.7	25.3	8,299.8	1,003.2	**9,303**
1990	4,712.8	341.1	95.1	138.5	1,185.6	**6,473.1**	1,695.4	40.4	26.8	8,235.7	1,067.3	**9,303**
2000	4,499.8	101.6	95.4	105.9	1,051.2	**5,853.9**	1,769.6	60.0	32.0	7,715.5	1,587.5	**9,303**
2008	4,502.8	96.1	98.5	82.6	1,009.8	**5,789.7**	1,884.4	59.4	34.7	7,768.3	1,534.7	**9,303**
	%											
1960	57.1	1.2	0.9	2.2	15.5	**76.8**	14.0	0.3	0.0	91.1	8.9	**100.0**
1970	54.2	1.6	1.8	2.5	13.8	**73.9**	15.9	0.3	0.0	90.1	9.9	**100.0**
1980	50.9	3.1	1.5	1.8	13.9	**71.2**	17.3	0.4	0.3	89.2	10.8	**100.0**
1990	50.7	3.7	1.0	1.5	12.7	**69.6**	18.2	0.4	0.3	88.5	11.5	**100.0**
2000	48.4	1.1	1.0	1.1	11.3	**62.9**	19.1	0.6	0.3	82.9	17.1	**100.0**
2008	48.4	1.0	1.1	0.9	10.9	**62.3**	20.2	0.6	0.4	83.5	16.5	**100.0**

Source: Hungarian Central Statistical Office (www.ksh.hu)

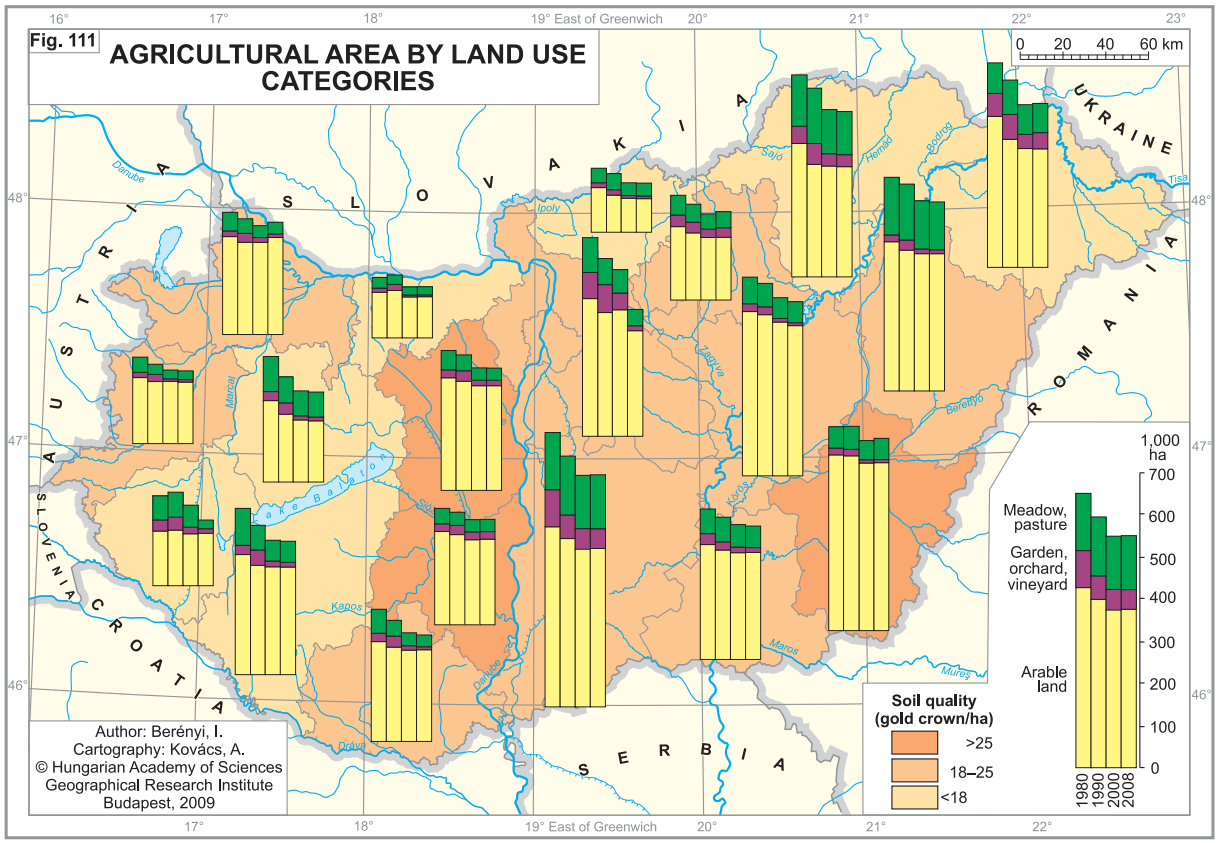
or dry floodplains along the Tisza and Körös rivers (alkali pastures, Hortobágy).

After 1960, due to accelerating urbanisation the extension of the area of cultivated land reduced as over 40 years approximately 800 thousand hectares ceased to be used for cultivation. In certain regions, the agricultural land use structure changed barely, even though the economic role occupied by agriculture, and the significance of some of the regions for farming, had changed profoundly. During the past decade the share of arable land (48.4% in 2008) within agricultural land use remained relatively stable (*Table 23*).

The productivity of agricultural land and, within this category, of ***arable land***, displays marked regional differences. A quarter of the country's agricultural land needs protection against wind erosion, or flood prevention and there are considerable regional differences in productivity, depending on the prevailing natural conditions (altitude, slope exposure, etc.). Therefore the extension of agricultural areas decreased between 1995 and 2000, with the exception of Békés County (*Figure 111)*.

Meadows and pastures occupy less than 18% of the country's agricultural area. Their total extension decreased between 1960 and 1980, particularly during the consolidation of land holdings (leading to the formation of larger plots of arable land between 1960 and 1965). In the early 1980s, some poorer quality arable land in the hills were converted back into pastures, as sheep stocks had increased to over 3 million, thanks to the good market conditions. Today, sheep stocks have fallen to 1.2 million, while the extension of grassland has actually increased; in the North Hungarian and Transdanubian Mountains a continuous grassland belt is beginning to take shape. Classic grassland management techniques were employed only for the sake of sheep farming, especially in the Hortobágy and the North Hungarian Mountains. The utilisation of natural grasslands is likely to gain ground once again if markets favour cost-sensitive production systems.

The most intensive agricultural sectors (wine and fruit production) were characterised by mixed ownership, even during the communist regime. Producers' cooperatives undertook organisational and marketing roles (e.g. in Bács-Kiskun County), so the transition after 1990 had much less impact upon this sector.



The national ***wine-growing area*** covers 82.6 thousand hectares, which is less than one third of the area compared to 40 years ago. 89% of vineyards are owned privately. About one third of them are found in the county of Bács-Kiskun, as its sandy soils produce good quality wine and champagne in larger volumes. The historical wine-growing areas stretch along the foothills from South Transdanubia to the Tokaj (Zemplén) Mountains, and the regions are popular not only for their wines, but also as rural tourist attractions for those interested in viticulture. The revival of wine-growing communities may help to strengthen local awareness and a sense of responsibility towards their home, which are essential ingredients for safeguarding the environment, soils, and maintaining high quality of wines.

The majority of the 98.5 thousand hectares of ***fruit-growing area*** is concentrated in two counties: apple and plum typical of Szabolcs-Szatmár-Bereg County, and apricot, peach, cherry and sour cherry are mainly grown in Bács-Kiskun County. As domestic consumption patterns have changed, canned fruit and drinks have become predominant.

The total area of ***gardens*** amount to 96 thousand hectares, although a trend in their decrease is visible, similar to that of land used for intensive cultivation. With urban growth and the horizontal expansion of settlements, gardens have partly been re-classified as 'built-up' (uncultivated) land. The functional change of gardens has mostly occurred in city agglomerations and on the urban fringe.

Forestry is an important activity on the land, second only to agriculture and is responsible for the management of 1.9 million hectares of forest. The forested area has grown by nearly 200 thousand hectares between 1989 and 2008, although privatisation and compensation in land are not favourable for long-term investment.

Uncultivated area extends over 1.53 million hectares. Between 1990 and 2006, the share of uncultivated land tended to grow (from 11.5% to 17.4%) on account of the newly emerged greenfield investments, the relocation of certain urban functions, the ongoing tradition of building detached houses and the construction of new 'residential parks'. This expansion came largely at the expense of the productive land area, although since 2006, this unfavourable trend has been reversed, mainly due to afforestation; productive land has grown by almost 100 thousand hectares.

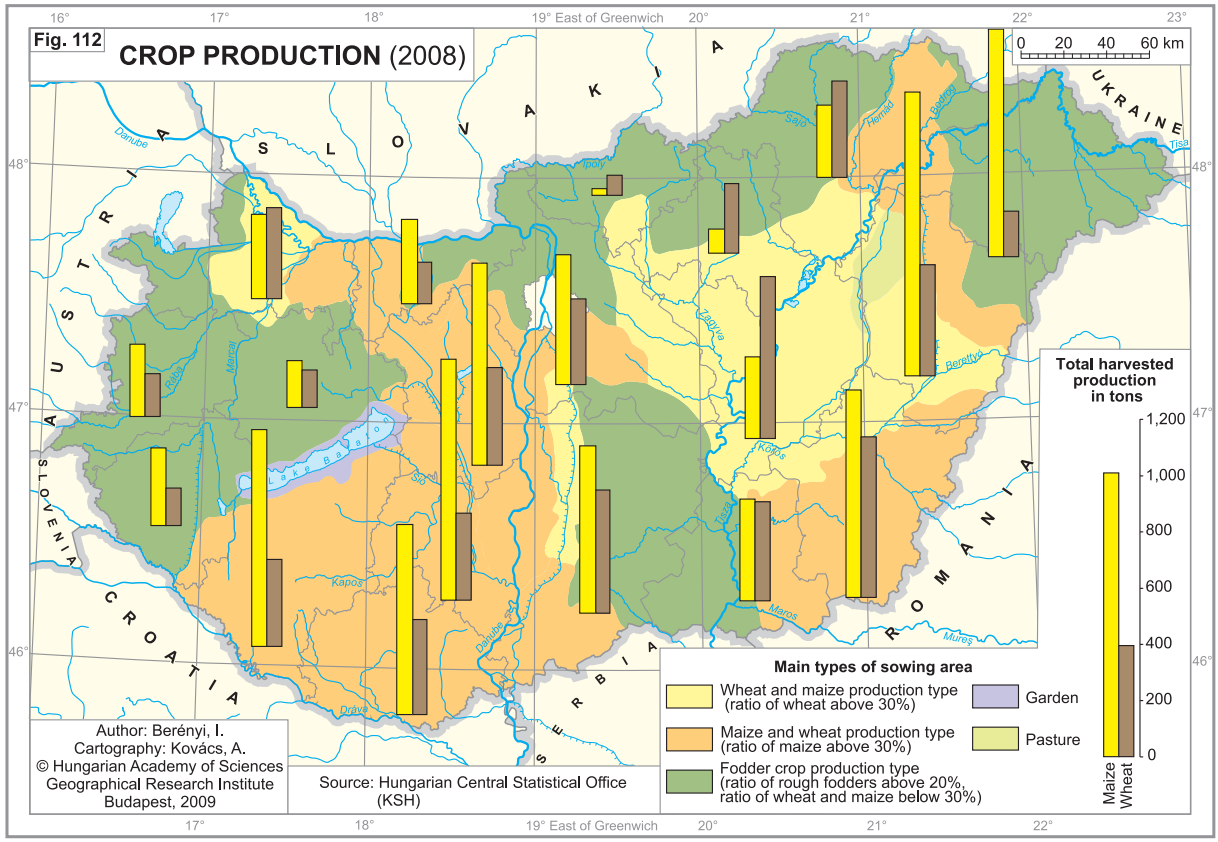
The structure of ***crop production*** hardly changed after 1990. Cereals currently occupy 64% of all arable land, and wheat is produced on 39% of this area (*Figure 112*). However, the land under fodder plants has shrunk due to the strong decline in livestock. A favourable change in the crop structure has been an increase in the cultivation of 'other crops', such as chilli peppers, vegetables, industrial crops and medicinal herbs, totalling 91 thousand hectares in 2007.

The sown area for wheat averaged 26.9% between 1986 and 1990. Since then this share has diminished, yielding 4 million tons in 2007. Maize cultivation continues to rank second by its extension within arable land, occupying 22.5% of cropland. Due to the decline in its domestic consumption, there has been a shift towards agricultural export, with expansion in its sown area and annual yields averaging 6 million tons over the past seven years.

Among industrial crops, the arable land used for sunflower cultivation has enlarged from 7.4% to 10%, which can be explained by the fact that vegetable oil production was privatised the earliest, and foreign ownership provided an easy access to western markets.

Transition after 1990 was the least problematic for the wine industry. Actively cultivated vineyards yielded 540 thousand tons of grapes in 2007, producing 320 million litres of wine. Red wine has gained ground, in harmony with increasing international and domestic demand. Nearly half of the wine-growing region lies in the Alföld (Danube–Tisza Interfluve, including areas around Kiskőrös, Hajós, Baja and Csongrád), with one third represented by the Transdanubian historical wine-growing areas (Villány, Mecsekalja, Szekszárd, Badacsony, Balatonfüred-Csopak, the Balaton region, Mór, Somló, Pannonhalma-Sokoróalja, Ászár-Neszmély and Sopron), and a further 20% to be found in the foothills of the North Hungarian Mountains (Mátraalja, Eger, Bükkalja and Tokaj-Hegyalja).

Fruit production has dropped from 1.5 million tons in 1990, to 1 million tons, largely due to the decline in apple exports to the



east. Illustrative of this decline is the fact that Szabolcs-Szatmár-Bereg County provided 42% of the national fruit production output in 1990, but only 36% in 1996. Large-scale orchards yield 30% of the production in Zala County, but the same figure is less than 10% for the other counties. 56% of the annual fruit growth is made up of four kinds of fruit (apple, peach, sour cherry and plum), which are predominantly processed into beverages, jams and alcohol. The extension of the country's orchards had decreased to 93 thousand hectares by l996, but new plantations opened in the following decade and the total cultivated area grew to 103 thousand hectares by 2006, 62% of which lies on the Alföld, 25% in Transdanubia, and the rest in the northern counties. The share of smallholders has always exceeded 80% in fruit production, since only a quarter of the 75–80 million fruit trees are in commercial orchards. A quarter of the fruit production is made-up of apple. The Danube–Tisza Interfluve (Kecskemét and Nagykőrös areas) has a reputation for various sorts of apricot, and although they only comprise 7% of all Hungarian fruit trees, they rank second in production quantity.

Animal husbandry was affected most severely by the transition in the early 1990s. Difficulties in profiting from livestock first emerged in the 1980s and production levels started to decline somewhat in the period 1985–1990 (*Figure 113*). Cattle stocks had halved in North Hungary, and were reduced to one third in Nógrád County (*Figure 114*). In 2007, cattle stocks were 705 thousand, having slightly increased thanks to the growing market for beef cattle. Pig stocks on the Alföld had decreased by 40%, while the sown area of maize remained unchanged. The pig stocks of North Hungary suffered a less severe decline. The national pig

Fig. 113

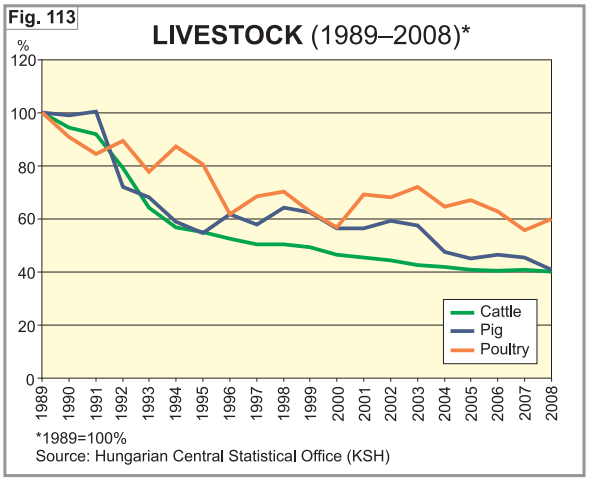
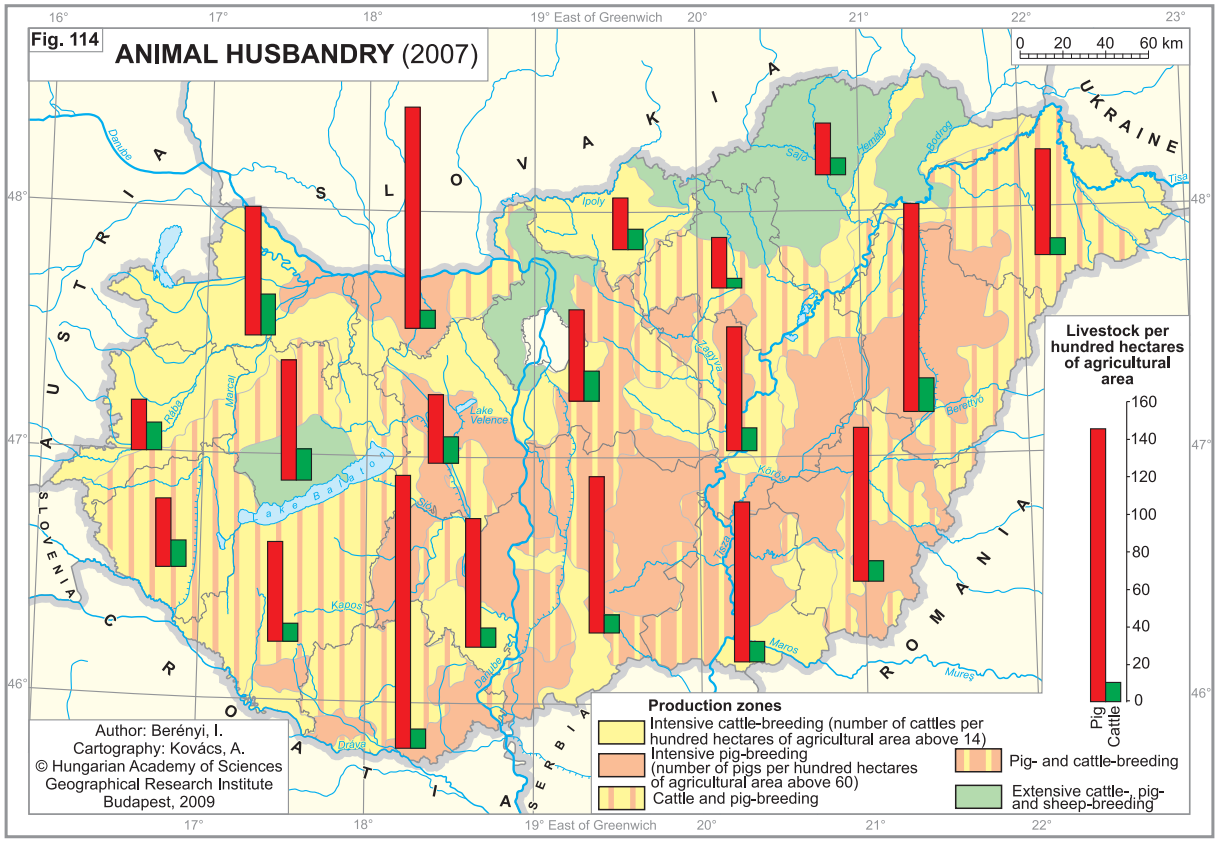


Fig. 114



stock is nearly four million, having fluctuated between 3.8–5.8 million for the past ten years. During the past decades, poultry production was the most rapidly developing (or least declining) sector of animal husbandry. Poultry stocks exceeded 45 million in 1982, then they dropped to 38 million in late 2007, of which 78% are gallinaceans. Nearly half are farmed on the Alföld, and 38% in Transdanubia (chiefly at Bábolna in Komárom-Esztergom County). Goose farming is less widespread, but the production of Hungarian foie gras has a long tradition in the vicinity of Kiskunfélegyháza. Sheep numbers dropped to one-third of previous stocks in the last decade (1.2 million, 2007), with commercial farms particularly cutting down on their stocks.

Transformation of Corporate and Ownership Conditions

According to the 1993 land-use statistics, corporations enjoyed rights over 20.2% of the national agricultural area; cooperatives owned 53.3%, whilst other organisations and farmers (e.g. smallholders and entrepreneurs) had 26.5%. The 1994 survey of the Hungarian Central Statistical Office revealed that 2 million households belonged to the latter group, possessing 1.6 million hectares, but only 1.5–2% of them had holdings over 10 ha. Private entrepreneurs farmed 0.1% of the national agricultural area.

In 1994, 51 thousand private farmers were registered and 80% of these farms had a mixed profile (involved in both plant cultivation and animal husbandry). 86% of the land cultivated by them was in their ownership, and 70% of this land was arable. Territorial data published on the activities of agricultural corporations and private farms in 2000 were not significantly different from those of the previous years. Data available for subsequent years only reveals statistics for both branches at a regional level.

The return of land that had been previously seized by the communist regime after 1990, affected various parts of the country to a differing degree. Fewer people had land returned in Transdanubia, thus, a larger proportion of land remained in the hands of commercial farms. On the other hand, corporate and ownership conditions in the Alföld had a more diversified structure even during the communist regime, due to the existence of producers' cooperatives, and this was further intensified by the compensation process that encouraged the establishment of private holdings (Bács-Kiskun and Szabolcs-Szatmár-Bereg counties). These two counties harbour 44% of all the agricultural land in the ownership of smallholders living on the Alföld, and have the highest percentage of smallholders across all agricultural areas (*Figure 115*). At the same time, the large-scale farm structure changed less in Jász-Nagykun-Szolnok County, because the rural population had declined to about half of its previous size, and is dominated by the elderly, resulting in weak capabilities for innovation. Thus, the transformation in the economic and farm structure of the intensive arable crop-producing counties of the Alföld was greater than in other counties of the countryside, but there was no change in the ratios of the pre-existing land use types, since entrepreneurs have continued to farm the same produce.

After the transition period, experienced and entrepreneurial groups of large-scale farms were able to become independent, whilst their former managers worked to keep these large farms together and reorganise them by making surplus manpower redundant, in particular on the remaining cooperatives. A smaller group of people that were in receipt of 'returned lands' attempted to establish farming entities. On a national scale, this succession of events resulted in a rapid decline of employment in the agricultural sector (*tables 24 and 25*).

After 1990, agrarian communities found themselves in a particularly difficult situation in counties where large-scale farms had only survived by being in receipt of state subsidies (which were already occurring from 1983–1988). Such a need arose, in many cases, due to the over-employment of labour that had been forced onto the farms through social ideology, which at the same time conserved their production structure (Szabolcs-Szatmár-Bereg, Borsod-Abaúj-

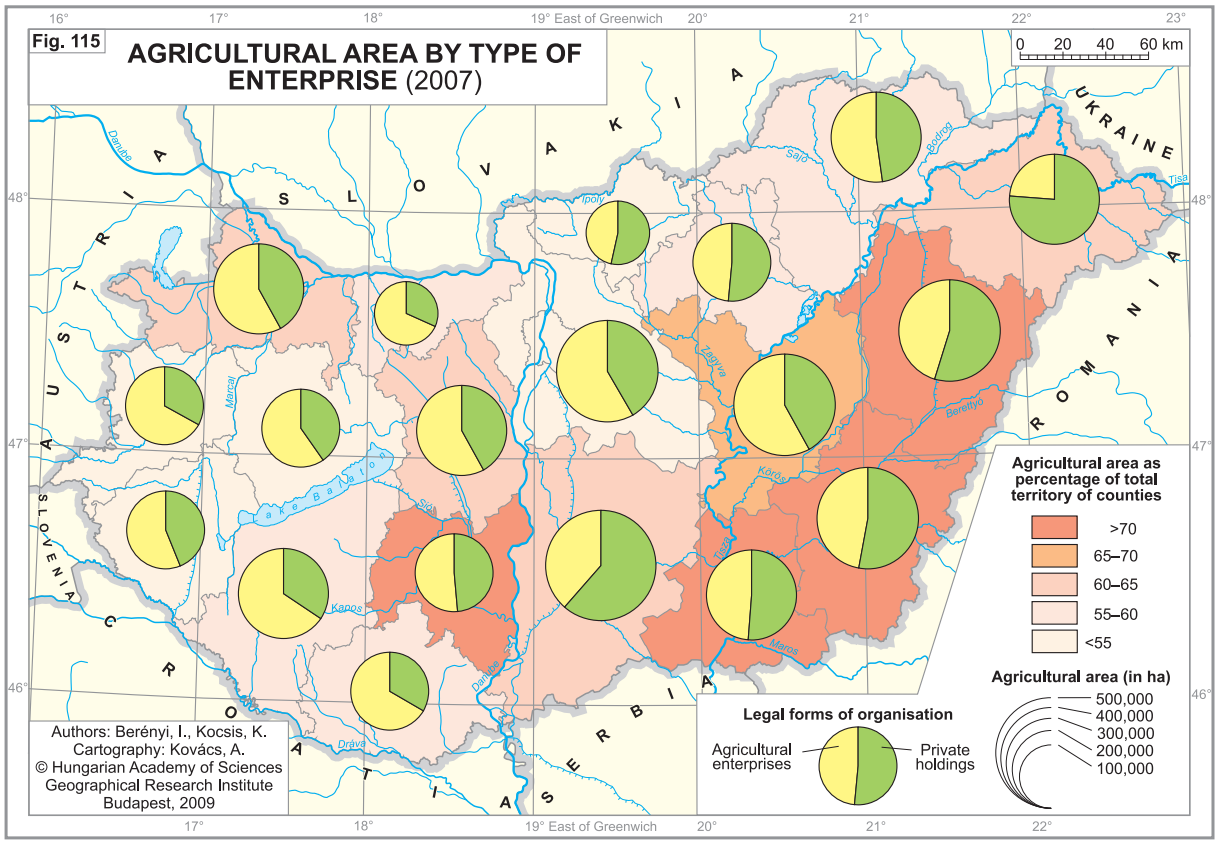


Table 24. ***Economically active persons in the agriculture and food industry (1985–2005)***

Year	Agriculture*	Of which occupied in basic activity	Food industry	Total
	thousand persons			
1985	981.1	660.6	202.5	**1,183.6**
1990	813.3	530.0	203.0	**1,016.3**
1995	308.5	..	..	**..**
2000	255.5	..	158.0	**413.5**
2005	194.0	..	140.0	**334.0**

*Including hunting, forestry and fishing.
Source: Hungarian Central Statistical Office (www.ksh.hu)

Table 25. ***Persons employed in the agriculture and food industry (1985–2005)***

Year	Agriculture*	Food industry	Total	Agriculture*	Food industry	Total
	thousand			ratio, %		
1985	..	..	..	20.0	4.1	**24.1**
1990	693	234	927	17.0	4.2	**21.2**
1995	295	157	452	8.0	4.3	**12.3**
2000	256	154	410	6.6	4.0	**10.6**
2005	194	140	334	5.0	3.6	**8.6**
2007	183	135	318	4.7	3.4	**8.1**

*Including hunting, forestry and fishing.
Source: Hungarian Central Statistical Office (www.ksh.hu)

Zemplén, partly Heves and Nógrád counties). Among them, the counties and small regions that were in the most critical situation, were those where heavy industry had also collapsed (in the surroundings of Ózd and Salgótarján), and thus both large employment sectors (agriculture and industry) released manpower into the economy.

Forestry, Game Management and Fishing

94% of the land managed as forest (1.9 million hectares) is actually forested, which means that 20.2% of the national territory is woodland (*Figure 110*). The proportion of deciduous stands is 85%, while coniferous areas are slowly declining. 57% of the forest stands can be considered native. With the restructuring in land use, and through environmental and landscape protection activities, forested areas grew by 20 thousand hectares in 2006–2007.

The annual growth of forests is 13.2 million m³, of which 6.6 million were logged in 2007 (*Table 26*). The direct value of this quantity of timber is 0.1% of GDP, but with the added value of the related processing industry, this figure is much higher. However, forests have a greater importance in the maintenance of historic landscapes, for recreation and supporting game stocks.

The international reputation of Hungarian game management and hunting is dependent upon the quality of large game stocks, and on the maintenance of a high standard of facilities for hunting. The top Hungarian trophies appear annually among the 'top ten' in the world, according to the C.I.C. qualifications. This attraction results in 25–30 thousand foreign hunters visiting Hungary annually. Hunting activities are evenly balanced with game stocks, to ensure the long-term maintenance of numbers (*Table 27*).

Fishing is carried out on 136 thousand hectares, and this figure has grown by 1,200 hectares since 2005. Because of low quantities of domestic consumption – a mere 4 kg per year per capita – the annual fish catch is 13–14 thousand tons. The export of live fish is far outweighed by the import of deep frozen sea fish and canned fish.

Table 26. ***Volume of timber production (thousand m³)***

Sector	2005	2006	2007
State	4,749	4,701	4,332
Private	2,395	2,282	2,253
Community	24	22	24
Total	**7,168**	**7,005**	**6,609**

Source: Agricultural Special Office, Forestry Management Department (Budapest, www.mgszh.gov.hu)

Table 27. Indices of game management sector

Game animals	2003–2004 hunting year	2004–2005 hunting year	2005–2006 hunting year	2006–2007 hunting year
	Estimated game stock (thousand units)			
Red deer	78.5	74.1	69.2	76.9
Fallow deer	20.5	21.6	21.8	23.9
Roe deer	320.8	316.0	310.4	312.0
Moufflon	7.9	8.3	9.2	10.1
Wild boar	77.8	78.1	77.7	77.8
Hares	535.1	520.9	535.2	472.1
Pheasants	691.0	736.8	796.9	723.7
	Number of game animals hunted (thousand units)			
Red deer	43.2	41.2	36.7	34.0
Fallow deer	8.4	9.1	8.9	9.3
Roe deer	76.8	85.9	89.9	79.5
Moufflon	2.9	3.0	2.8	2.6
Wild boar	81.5	86.8	79.5	94.0
Hares	102.4	132.7	105.1	95.7
Pheasants	391.3	453.1	474.0	432.8

Source: Szent István University (Gödöllő, www.szie.hu)

Agriculture and the Rural Environment

Some of the severest problems facing the rural community are population decline and ageing, as well as the loss of cultural heritage, causing enduring difficulties. The situation is particu-

larly grave in settlements of less than a thousand inhabitants, where 8% of the population lives, or 776 thousand people. These villages number 1,705 and they make up 54.4% of all settlements in Hungary (2001).

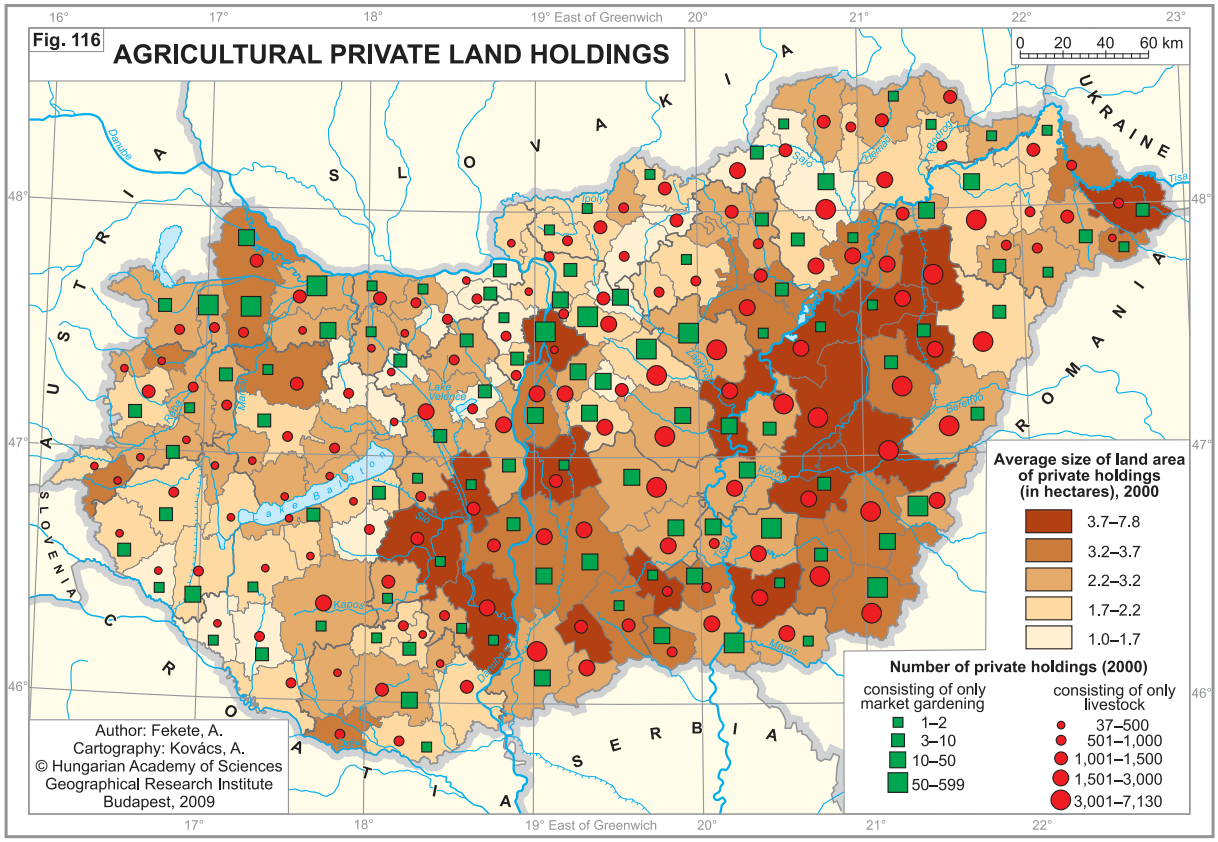
Between 1988 and 1992, the manpower released by a decline in industry partly relocated to their native rural environment, but achieved little else than bolstering the numbers of unemployed. In small villages, population decline has remained a general phenomenon and the proportion of the elderly continues to be well above the national average (*Table 28*). The result is that the age group upon which rural rejuvenation could be founded is steadily waning.

In 2009, the population of the country dropped to 10 million, which is primarily a disadvantage for rural society, as innovative members of society as a rule are likely to see a chance for success in cities and other urbanised areas. At the same time, young agricultural entrepreneurs form a growing class in rural society, using niche specialisation to compete with the mass production of privatised, large-scale commercial farms. A survey in 2000 on the output of private agricultural holdings reveals a definite corporate and territorial specialisation (*Figure 116*). Private holdings only dealing with animal husbandry or intensive horticulture are concentrated on the lowlands (Alföld and Kisalföld) and in city regions, whilst differences in land use and the structure of large-scale commercial production are most visible in the mountains and hilly regions lying along the south-west–north-east

Table 28. ***Age structure of the population of small villages (2001)***

Age group	Population categories of villages with				Country total	
	200–499 inhabitants		< 200 inhabitants			
	persons	%	persons	%	persons	%
0–14	43,522	18.1	6,119	16.1	**1,694,936**	**16.6**
15–59	137,058	57.2	20,623	54.3	**6,421,820**	**63.0**
60 <	59,354	24.7	11,226	29.6	**2,081,559**	**20.4**
Total	**239,934**	**100.0**	**37,968**	**100.0**	**10,198,315**	**100.0**

Source: Hungarian Central Statistical Office (www.ksh.hu)



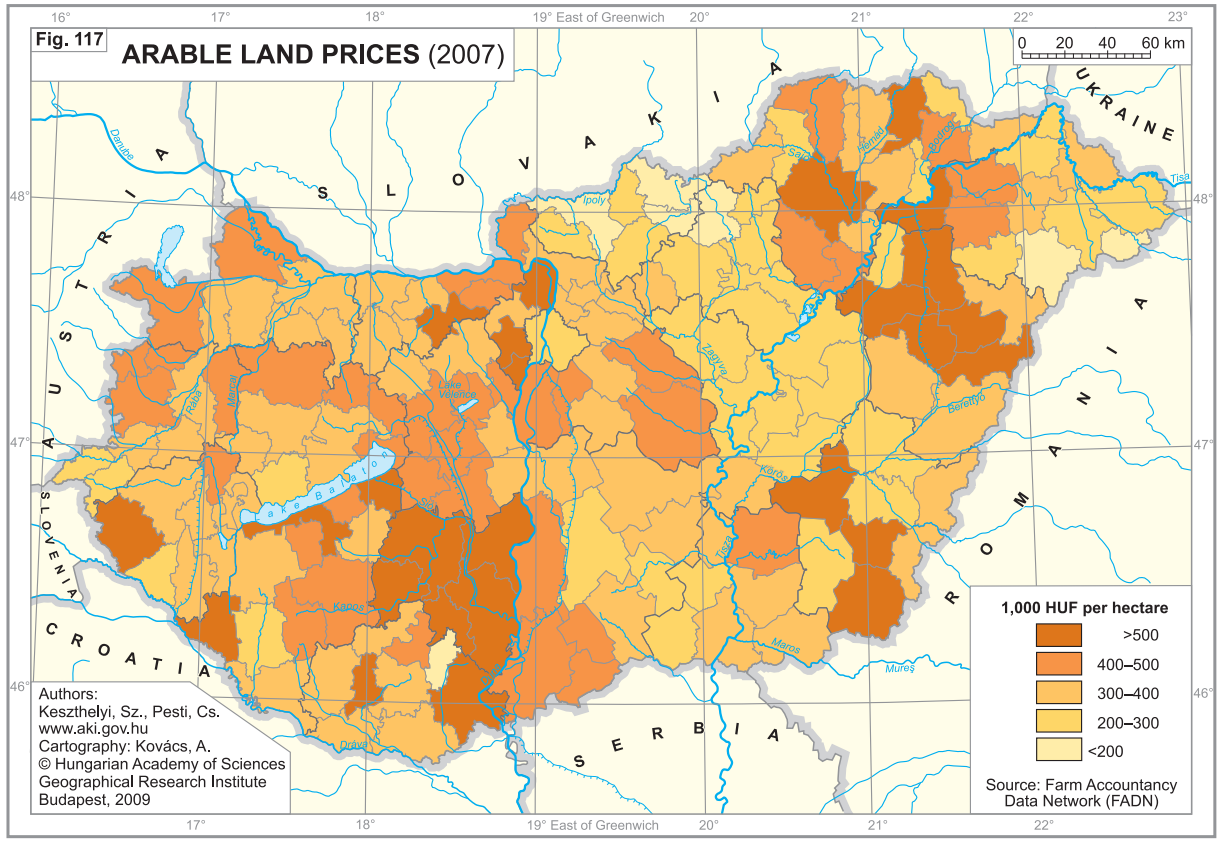
axis of the country. The above characteristics may trigger the reinvigoration of rural agrarian society, an aim that was facilitated by the SAPARD (Support for Pre-Accession Measures for Agriculture and Rural Development) programme since 2000, and ended with Hungary's accession to the EU (2004), even though the implementation of some programmes was only completed in 2007 (*Table 29*).

SAPARD and other development programmes have also had an effect on the market for land, increasing demand especially for arable land, mainly in regions, such as South Transdanubia, where the proportion of arable land is low. In this region the market value of arable land with low productivity rose very fast (*Figure 117*).

Table 29. ***Resources and payments of the SAPARD programme (2000–2007)***

Descriptions	Resources		Payments		Payment rate, %
	billion HUF	distribution, %	billion HUF	distribution, %	
Agricultural enterprise development	20,278.7	37.3	20,272.9	37.9	100.0
Food and fish processing; marketing development	17,690.4	14.1	16,678.7	31.2	94.3
Village development and reconstruction; protection and conservation of rural artefacts and cultural heritage	2,715.2	5.0	2,940.9	5.5	108.3
Diversification of activities, development of alternative income-generating activities	463.2	0.9	416.6	0.8	89.9
Development of rural infrastructure	13,187.0	5.9	13,136.3	24.5	99.6
Technical assistance	73.9	0.1	73.9	0.1	100.0
Total	**54,408.4**	**100.0**	**53,519.3**	**100.0**	**98.4**

Source: Ministry of Agriculture and Rural Development (www.fvm.hu)



Mining and Energy Supply

Mining

By international comparison, ore mining in Hungary was a significant industry during the Middle Ages.

The country was also a leader in gold mining in 13th century Europe (two fifths of world production), and ranked second in silver mining (one quarter).

The world's first mining school ('Bergschola') was founded in 1735 in the Kingdom of Hungary at Selmecbánya (Schemnitz, today Banská Štiavnica in Slovakia), which was bestowed the rank of a mining academy ('Bergakademie') by Empress Maria Theresia in 1770.

The once famous precious metals mining industry had fallen into decline by the early 19th century, but economic prosperity during the time of the Austro-Hungarian Monarchy lent a new impetus to iron ore production and the quarrying of construction materials.

Following World War I, almost all the ore and salt mines, hydrocarbon resources and one-third of coal deposits had been annexed by the Treaty of Trianon, as they were in territories awarded to neighbouring countries.

After World War II, as was the case in most Eastern Bloc countries, the share of mining rose within overall industrial output, as a result of hasty industrialisation and the considerable efforts required to meet the country's demand from domestic resources for fuel, as well as other raw materials.

Over the past thirty years or so, the specific problems experienced by some branches within the mining industry, and imperatives of efficiency, have led to a mining crisis and the drop in its share within industrial production from 11.2% (1950) down to 0.5% (2008).

Hungary is a country with limited natural resources.

At the same time, the solid and liquid resources that are available, represent a colossal value and there is an ample supply of certain energy-rich materials, ores, and minerals (coal, lignite, bauxite, limestone, etc.), which arises due to the specific geological structure and character of the Carpathian Basin.

Even though the domestic mining of most natural resources might be limited, and the country is strongly import-oriented, available resources play a fundamental role in the national economy, being an important factor in its sustainability and contributing to the gradual improvement in living standards.

At the end of 2007, the National Cadastre of Resources registered 23.8 billion tons of industrial (recoverable), and 37.7 billion tons of geological reserves at 3,600 locations.

Projections indicate 480 billion tons of industrial, and 644 billion tons of, as yet-to-find (prospective) natural resources nationwide.

About eighty different mineral products are known to be found in the country's terrain, 98.5% of which (by weight) are proven reserves of *solid minerals* (37.7 billion tons).

Of the nation's total mineral reserves, 67.4% are non-metallic mineral resources, 28% coals, 3.1% ores, and 1.5% are *hydrocarbons (Table 30)*.

Lignite, non-metallic mineral resources and certain construction materials represent the greatest quantities, and are of considerable financial value.

Hungary is ranked among the five leading producers of gallium and perlite in the world, whilst it occupies a rank of between tenth and twentieth largest producer of bauxite, lignite and manganese.

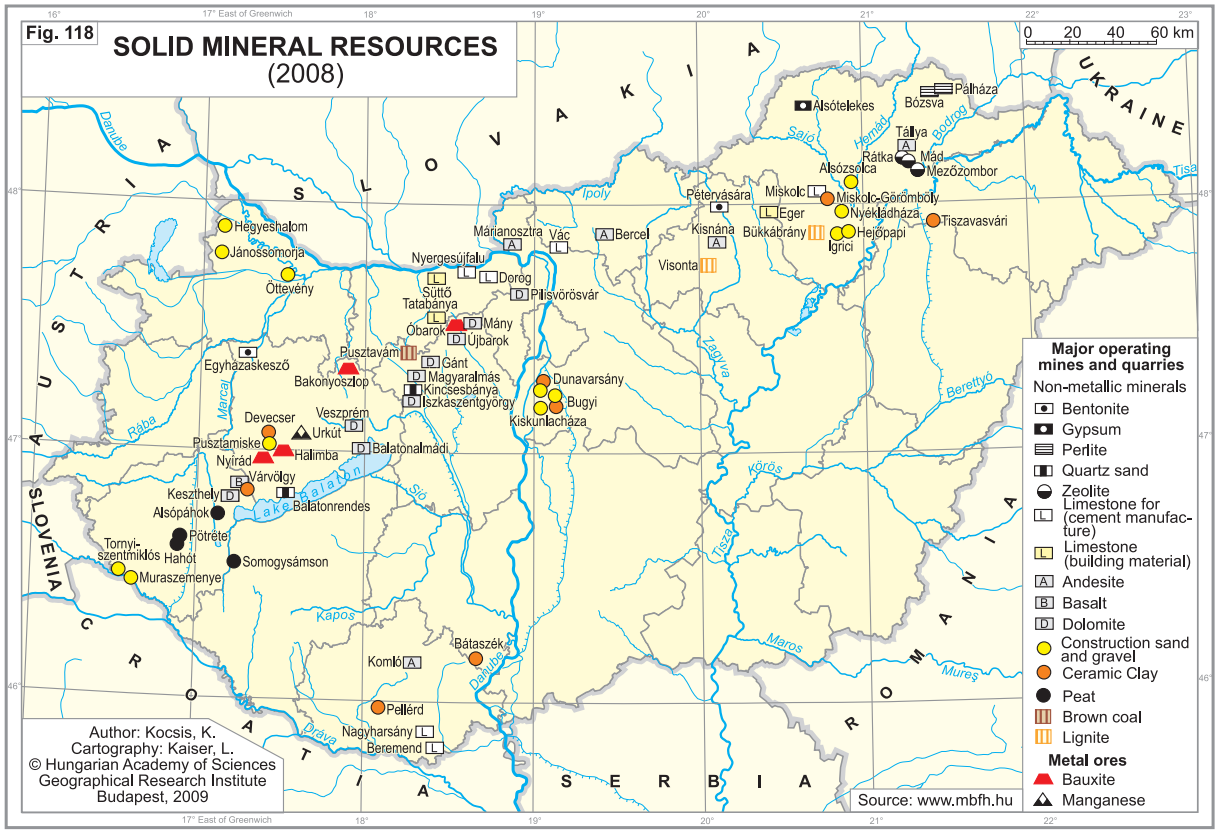
Table 30. ***Mineral resources (2008)***

Type of mineral	Production in 2007	Geological reserves 01.01.2008	Industrial reserves 01.01.2008	Undiscovered (hypothetical) industrial reserve	Average life-expectancy of reserves at 2007 production levels based on total extractable resources
	million tons				years
Crude oil	0.84	207.0	19.2	10-58	23
Natural gas*	2.65	5,307.0***	3,355.3***	29-93	25 (>50***)
Carbon dioxide gas**	0.11	46.14	32.4	..	> 100
Hard coal	..	1,596.7	1,986.2	336	no production
Brown coal	1.45	3,199.7	2,245.5	975	> 100
Lignite	8.35	5,782.2	4,376.8	1,236	> 100
Uranium ore	..	26.8	26.8	7	no production
Iron ore	..	43.1	43.6	37	no production
Bauxite	0.5	127.0	82.0	151	> 100
Lead-zinc ore	..	90.8	100.2	192	no production
Copper ore	..	781.2	726.5	276	no production
Precious metals	..	36.6	36.5	21	no production
Manganese ore	0.05	79.6	52.6	9	> 100
Non-metallic minerals	3.0	3,200.0	1,002.4	16,004	> 100
Raw materials for the cement and lime industry	5.5	2,872.3	1,301.0	17,307	> 100
Dimension and crushed stone	13.0	4,220.1	2,362.7	99,549	> 100
Construction sand, gravel	34.8	8,035.8	4,855.0	203,648	> 100
Clays for the ceramic industry	4.9	1,889.8	1,074.5	141,131	> 100
Peat, paludal lime mud	0.1	182.0	110.4	..	> 100
Total	**75.3**	**37,723.8**	**23,789.6**	..	..

Remarks: * 1000 m^3 natural gas = 1 t crude oil. ** 1000 m^3 gas = 1 t. *** including non-conventional Makó deposit.
Source: Hungarian Mining and Geological Institute (www.mbfh.hu)

Solid Mineral Resources

Explored geological reserves of ***non-metallic mineral resources*** represent 20.4 billion tons, 52.5% of which is economical to recover. Nearly 80% of the annual output of the more than 1,100 functioning quarries (61.4 million tons in 2007) is construction sand, gravel, dimension and crushed stone. This volume of production guarantees a long-term supply for the Hungarian processing industry and facilitates the export of some products, e.g. perlite, glass sand and construction gravel. One can conclude that Hungary has a medium level of non-metallic mineral resources, and the country is even rich in some of them (e.g. quartz sand, perlite, bentonite, gypsum and zeolite) to be found in the North Hungarian and Transdanubian Mountains (*Figure 118*). Due to Hungary's geological endowments (its basement position in the Carpathian Basin) there is an oversupply of building materials. High capacity limestone quarries, supplying *raw materials for the cement and lime industry,* operate at Vác, Miskolc, Beremend, Nagyharsány and Nyergesújfalu. The largest extraction centres for *dimension and crushed stones* are in the North Hungarian and Transdanubian Mountains: limestone (Tatabánya, Eger and Süttő); dolomite (Iszkaszentgyörgy, Gánt and Keszthely); basalt (Várvölgy-Uzsa); and andesite (Tállya, Kisnána, Márianosztra and Bercel). Additives used in the production of concrete (*construction gravel and sand* of fluvial origin) are mainly found in the alluvial fans of the Danube, Sajó, Lajta and Mura rivers (e.g. Bugyi, Kiskunlacháza, Hejőpapi, Nyékládháza, Hegyeshalom and Muraszemenye). The mining of *clays for the ceramic industry* (bricks and tiles) shows a relatively uniform spatial pattern. The largest clay pits are along the Danube (Bugyi and Dunavarsány), in the north (Görömböly and Tiszavasvári), and in Transdanubia (Várvölgy-Uzsa and Devecser). The main deposits of *peat* (as a fuel and raw material for the manufacture of fertilisers) can be found in South West Transdanubia (near Little Balaton).

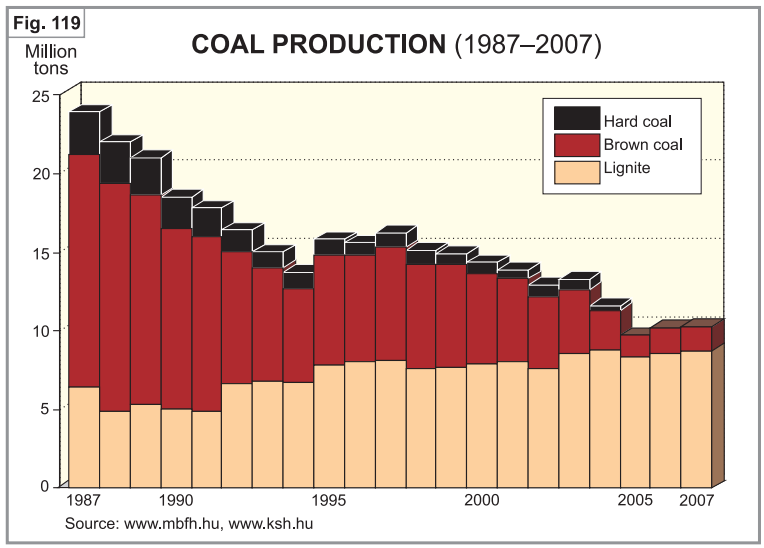


Coals. Although coal mining in Hungary started at Brennbergbánya-Sopron as early as 1753, industrial-scale production gained momentum with the expansion of steamship navigation on the Danube, and the spread of steam powered flour mills over the country, from the 1830s onwards.

During the era of the Austro-Hungarian Monarchy, it was dynamic industrialisation and the rapid expansion of the railway network that was the main consumer. Subsequently electricity generation has become the primary consumer, and coal production has increased from 2 million tons up to 8 million tons.

Following World War II, the coal mining branch (nationalised by then) was expected to rise to the challenges presented by enforced socialist industrialisation, with its highly power-intensive activities, and output had grown to 31.5 million tons by 1964. The oil crisis in 1973 led to the stabilisation of production at around an annual 25 million tons until the mid-1980s. Since then, due to the increasing efficiency of fuels, economic crises and the inefficiency of domestic mining, most deep shaft mines have been closed (*Figure 119*). The bulk of the output of 10 million tons per year is lignite with a low calorific value, mined opencast.

Fig. 119



Mining of highly calorific (Liassic) *hard coal* in the Mecsek Mountains was terminated in 2004. Mines producing (Eocene and Miocene) *brown coal* in the Transdanubian and North Hungarian Mountains were closed at roughly the same time. The only exception is Márkushegy at Pusztavám (North Transdanubia) with a sizeable output. Pannonian *lignite* with its low heating quality is economically recoverable by strip mining and used for energy generation. There are 4.4 billion tons of workable reserves in deposits along the southern foothills of the Mátra and Bükk mountains (Visonta and Bükkábrány) and along the border with Austria (Torony). They may prove to be instrumental in diversifying the power supply, rendering it less dependent on imports.

Ores. Prior to World War II the centres of ore mining (on the present territory of the country) were Gánt (bauxite), Úrkút and Eplény (manganese), Rudabánya (iron) and Recsk (copper). During the socialist era, due to the dynamic development of the aluminium industry, production of bauxite steadily increased, reaching nearly 3 million tons in 1980, only to decline considerably after 1990. Owing to the deteriorating geological conditions and high costs of production, bauxite mining as become uncompetitive on the world market and output has recently dropped down to 0.5 million tons. Bauxite is currently mined at Halimba, Bakonyoszlop, Nyirád and Óbarok.

Geological reserves worthy of mention but not presently economical to recover, are *non-ferrous metal ores* (copper, zinc, lead, etc.) in the Mátra Mountains (key deposits at Recsk), and precious metal reefs at Nagybörzsöny, Recsk, Telkibánya and Füzérradvány, locations where gold and silver have been mined for centuries. *Uranium ores* are known and explored to the west of the Mecsek Mountains (Kővágószőlős), in green sandstone of Upper Perm, though these are unfavourably located for mining. Between 1954 and 1997, 16.4 million tons of ore was extracted and residual reserves are estimated at 27 million tons. Mining activities were closed in 1997 because of the high costs of production, relative to the price of uranium on the world markets, and due to the generally low competitiveness of the branch.

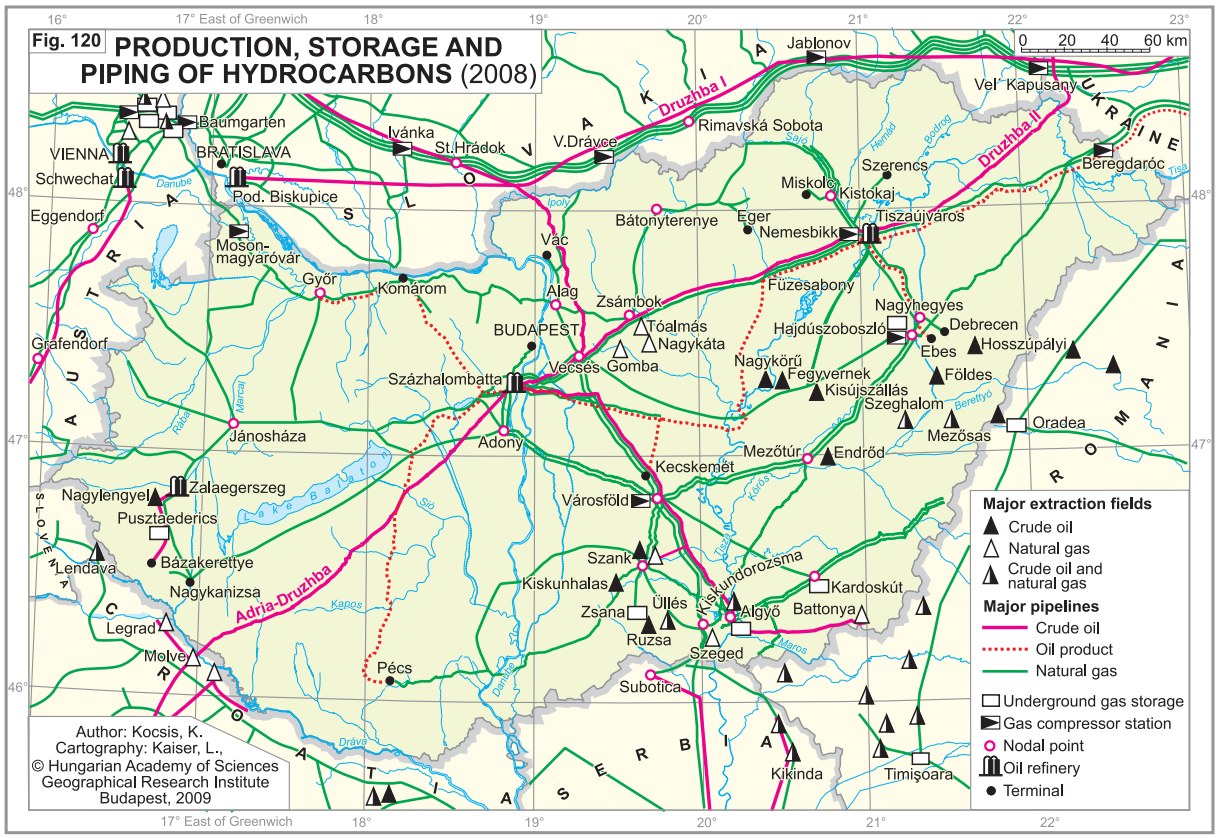
Iron ore deposits are mainly concentrated at Rudabánya, where mining stopped in 1985. Manganese is to be found at Úrkút (Transdanubia) with an annual output of merely 0.05 million tons.

Hydrocarbons

By the end of the 20th century and over the recent past decade, the main issues at the core of Hungary's energy production policy were energy security, economic growth and environmental protection. The most important parts of government activity have been the exploration, production, transportation, refinery, and allocation of hydrocarbons among the different sectors of the national economy, including the use of raw and refined materials for energy generation, industrial, and residential uses. Hydrocarbons – as fundamental natural resources – are relatively new actors in the national economy of Hungary. Although earlier governments encouraged exploration already at the end of the 19th century, the first indications of the existence of gas and oil resources were reported between 1914 and 1919. After the pioneering age, exploration accelerated the discovery of substantial hydrocarbon resources in numerous locations in the country, and as a result, the industrial production of oil and gas started in the mid-1930s. In recent years, the active area of exploration totaled roughly 75,000 km^{2,} at 68 locations and nearly 50% of them were under the control of MOL (Hungarian Oil and Gas Company).

In terms of the sheer quantity of hydrocarbon resources, they are much less than coal, but the number of occurrences is not in least. The most important (and currently still active) oil and gas fields can be found in the southern and southwestern part of Hungary (*Figure 120*).

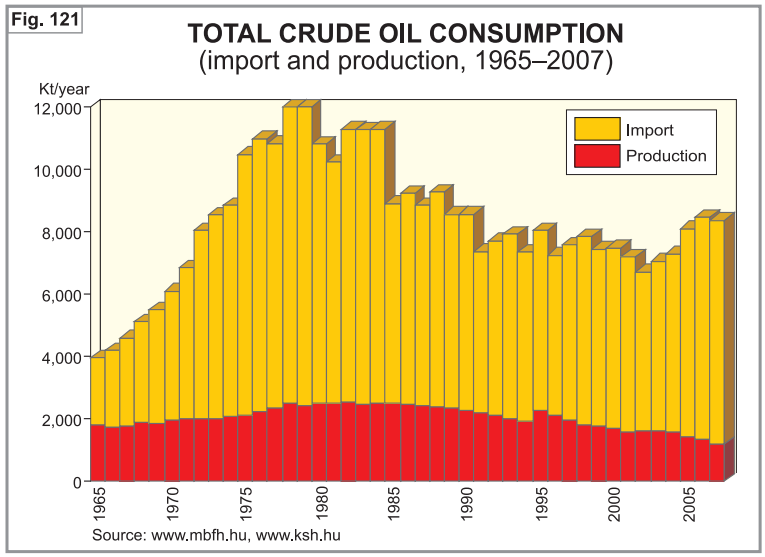
Industrial scale ***oil*** production began in 1937, when the Eurogasco drilled a well into the Budafa formation. During the same period, the Hungarian-American Oil Co. (MAORT) also found recoverable quantities of oil in the nearby regions of Lovászi, Hahót and Újfalu. Afterwards, the production rate steeply increased, and output reached 420 Kts in 1940; Hungary became a net oil exporter in Europe. During, and immediately after the disruption caused by World War II, oil production soon dropped, despite the fact that new oil and gas fields were discovered not only in Transdanubia, but also in the Alföld (Great Hungarian Plain).



By the mid-1950s, a reservoir bearing heavy oil was discovered close to Nagylengyel. The spike between 1953 and 1957 in the cumulative production diagram indicates its significant contribution to domestic production. The golden age of Hungarian oil production started when the stacked oil and gas field was discovered at Algyő. Soon the production rate increased to 1,500 Kts annually and leveled out at 2,000 Kts per annum for nearly ten years (1976–1986). Since new fields with similar reserves were not discovered, production gradually declined from 1990 onwards, and cumulative domestic oil production continued to remain on the same downward trajectory. These days, 207 million tons of geological reserves exist in Hungarian oil fields, although the recoverable reserve is a mere 19.2 million tons. Hence, current resources at the present annual production rate will be exhausted in roughly 23 years.

Due to rapid industrial development, a dynamic growth in transport and consumption of the population, domestic hydrocarbon production has been unable to meet demand since the 1960s. In 1965, imported crude oil already accounted for 50% within total consumption (*Figure 121*). Since then, the import dependency of the country has gradually increased and reached 86% (total consumption was 8,357 million tons and domestic production 1,193 million tons in 2007). The share of oil in the Total Final energy Consumption (TFC) figure stood at 31.9% in 2004. The responsible organisation forecast a greater than 2% annual growth in oil demand, although domestic production is expected to have by 2030 (output of slightly above 0.5 million tons per annum is predicted).

Fig. 121



Russian crude oil imports arrive exclusively via the 'Druzhba (Friendship) II' pipeline (*figures 121 and 122*). In 2005, the amount of oil import transported through this pipeline totaled 6.1 million tons. Another international pipeline ('Adria') connects the largest Hungarian refinery to the oil terminal in Omišalj on the Adriatic Sea (Croatia). In addition, the 4 Hungarian oil refineries benefit from pipeline connections, both amongst one another and externally with the Slovnaft Refinery (Bratislava) in Slovakia. These refineries and ongoing new installations serve the primary goal of ensuring compliance with the requirements of new EU fuel regulations.

Hungary's energy security situation is strained. Domestic production and reliable imports are the highest priorities, as the share of ***natural gas*** in the energy mix is 45% which is the highest among all European countries. Thus, the joint share of crude oil and natural gas represents more than two-thirds of the Total Primary Energy Supply (TPES). Until 2020, the share of natural gas will probably increase by an additional 24.5% (up to 15.6 Mtoe), and hence, crude oil and natural gas will remain indispensable and a determining factor in ensuring ongoing energy supplies.

The exploration of natural gas coincided with the search for crude oil, and its industrial scale production began in 1937, but the production rate remained very low until 1960. In the mid-1960s, however, gas production rapidly increased and it reached its maximum less than ten years later, with an annual production rate of almost 7 Mtoe (7 Gm^3). The majority came from large gas reservoirs in the southern part of the Alföld (Hajdúszoboszló and Algyő), whilst smaller extraction enterprises operated in Transdanubia. As shown in *Figure 123*, this period of abundance ended in 1990 and production began to considerably decline. Recently total gas production output is fluctuating around 2.6 Mtoe (2.6 Gm^3), but a further drop in production is anticipated. Total natural gas resources amount to 5,307 Mtoe, of which 3,355 Mtoe is recoverable; remaining reserves are expected to last more than 50 years (including the unconventional Makó deposit).

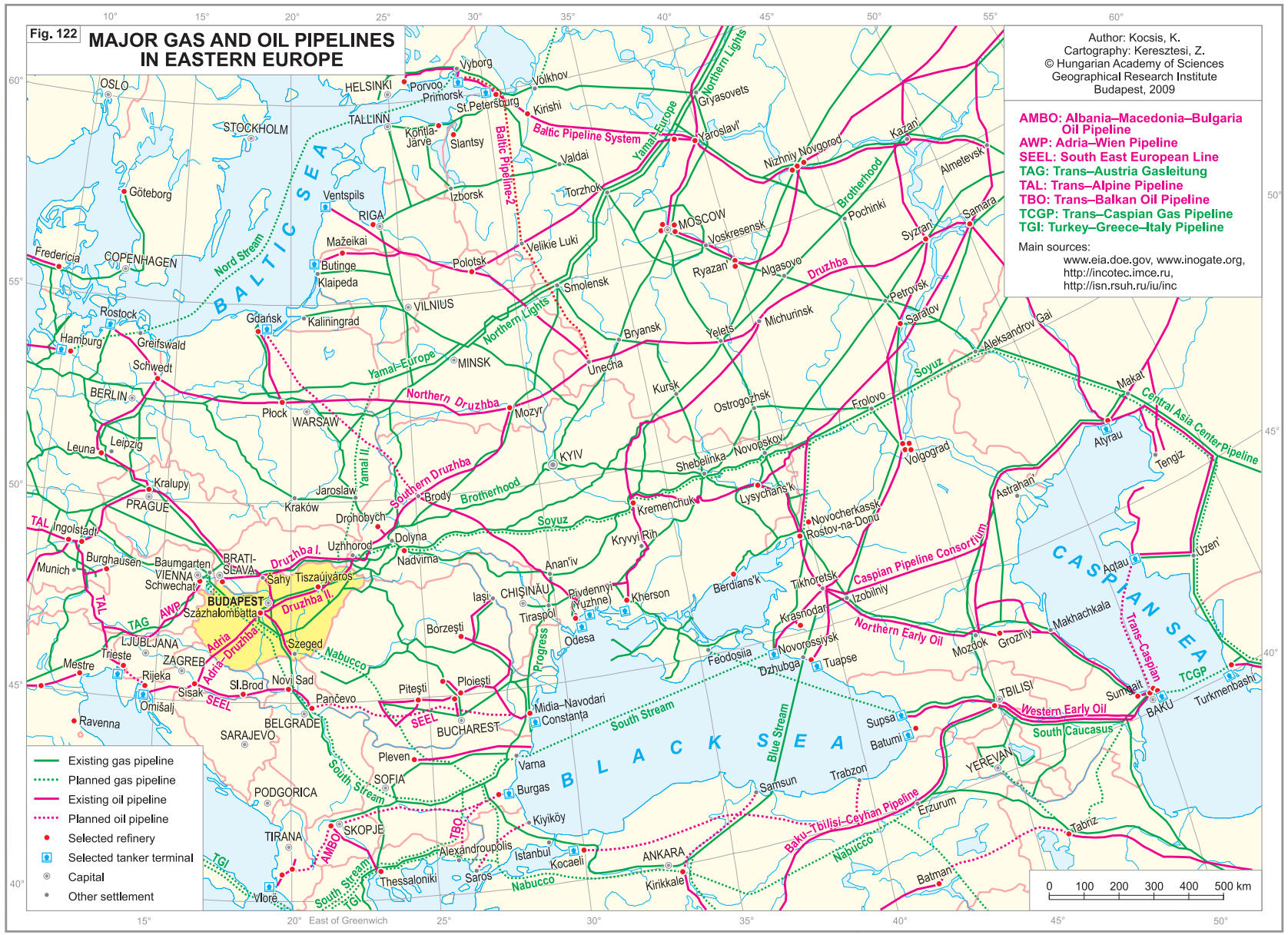
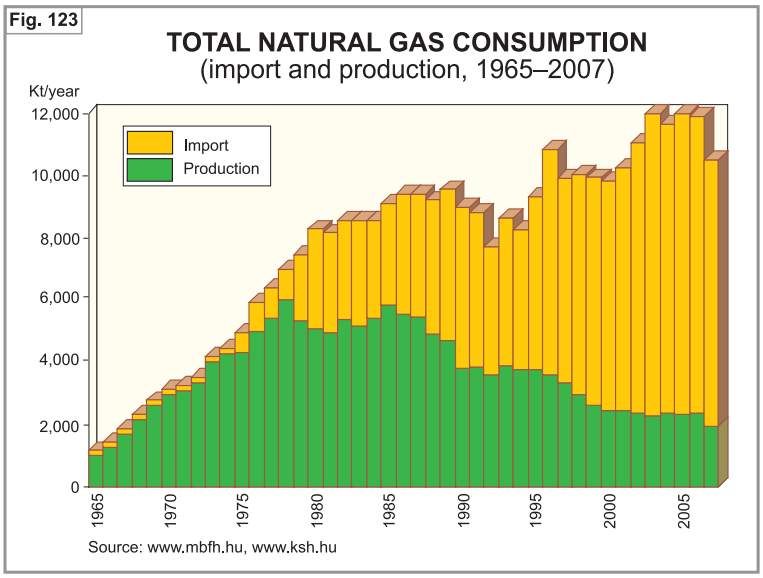


Fig. 122
MAJOR GAS AND OIL PIPELINES IN EASTERN EUROPE
Author: Kocsis, K.
Cartography: Keresztesi, Z.
© Hungarian Academy of Sciences
Geographical Research Institute
Budapest, 2009
AMBO: Albania–Macedonia–Bulgaria Oil Pipeline
AWP: Adria–Wien Pipeline
SEEL: South East European Line
TAG: Trans–Austria Gasleitung
TAL: Trans–Alpine Pipeline
TBO: Trans–Balkan Oil Pipeline
TCGP: Trans–Caspian Gas Pipeline
TGI: Turkey–Greece–Italy Pipeline
Main sources:
www.eia.doe.gov, www.inogate.org,
http://incotec.imce.ru,
http://isn.rsuh.ru/iu/inc
Existing gas pipeline
Planned gas pipeline
Existing oil pipeline
Planned oil pipeline
Selected refinery
Selected tanker terminal
Capital
Other settlement
0 100 200 300 400 500 km
East of Greenwich
BALTIC SEA
BLACK SEA
CASPIAN SEA
Baltic Pipeline System
Baltic Pipeline 2
Yamal–Europe
Northern Lights
Nord Stream
Northern Druzhba
Southern Druzhba
Druzhba
Brotherhood
Soyuz
Central Asia Center Pipeline
Caspian Pipeline Consortium
Trans-Caspian
Northern Early Oil
Western Early Oil
South Caucasus
Baku–Tbilisi–Ceyhan Pipeline
Nabucco
South Stream
Blue Stream
Progress
Adria–Druzhba
Yamal II
Druzhba I.
Druzhba II.
OSLO
HELSINKI
STOCKHOLM
TALLINN
Göteborg
COPENHAGEN
Fredericia
Rostock
Hamburg
Greifswald
Schwedt
BERLIN
Leipzig
Leuna
Kralupy
PRAGUE
Ingolstadt
Munich
Burghausen
Baumgarten
VIENNA
Schwechat
BRATISLAVA
Sahy
Tiszaújváros
BUDAPEST
Százhalombatta
Szeged
LJUBLJANA
Trieste
Mestre
Ravenna
ZAGREB
Rijeka
Sisak
Sl.Brod
Novi Sad
Omišalj
Pančevo
BELGRADE
SARAJEVO
PODGORICA
TIRANA
Vlorë
SKOPJE
SOFIA
Pleven
Pitești
Ploiești
BUCHAREST
Midia–Navodari
Constanta
Varna
Burgas
Kiyiköy
Alexandroupolis
Thessaloniki
Saros
Istanbul
Kocaeli
ANKARA
Kirikkale
Samsun
Trabzon
Batumi
Supsa
Erzurum
Tabriz
YEREVAN
TBILISI
BAKU
Sumgait
Turkmenbashi
Aktau
Atyrau
Tengiz
Uzen'
Astrahan'
Volgograd
Saratov
Petrovsk
Aleksandrov Gai
Makat
Frolovo
Ostrogozhsk
Kursk
Unecha
Bryansk
Smolensk
MINSK
VILNIUS
Kaliningrad
Gdańsk
Ventspils
RIGA
Mažeikai
Butinge
Klaipeda
Polotsk
Velikie Luki
Izborsk
Torzhok
Valdai
Slantsy
Kohtla-Järve
Porvoo
Primorsk
St.Petersburg
Vyborg
Volkhov
Kirishi
Gryasovets
Yaroslavl'
MOSCOW
Voskresensk
Ryazan'
Algasovo
Michurinsk
Yelets
Nizhniy Novgorod
Pochinki
Syzran'
Samara
Kazan'
Almetevsk
Plock
WARSAW
Mozyr'
KYIV
Brody
Jaroslaw
Kraków
Drohobych
Dolyna
Uzhhorod
Nadvirna
Kryvyi Rih
Kremenchuk
Shebelinka
Novopskov
Lysychans'k
Novocherkassk
Rostov-na-Donu
Volgograd
Anan'iv
Iași
CHIȘINĂU
Tiraspol
Odesa
Pivdennyi (Yuzhne)
Kherson
Berdians'k
Tikhoretsk
Izobilniy
Krasnodar
Novorossiysk
Dzhubga
Tuapse
Feodosia
Mozdok
Grozniy
Makhachkala
Borzești
Progress
Midia–Navodari
Constanta
Ploiești
Pitești
SEEL
Nabucco
Adria
Adria–Druzhba
AWP
TAG
TAL
TBO
TGI
South Stream
Blue Stream
Baku–Tbilisi–Ceyhan Pipeline
Northern Early Oil
Western Early Oil
South Caucasus
Trans-Caspian
TCGP
Caspian Pipeline Consortium
Northern Lights
Yamal–Europe
Northern Druzhba
Southern Druzhba
Brotherhood
Soyuz
Central Asia Center Pipeline
Baltic Pipeline System
Baltic Pipeline 2
Nord Stream
Druzhba
Yamal II
Druzhba I.
Druzhba II.

Fig. 123



Since 1973, Hungary has no longer been self-sufficient in its gas supply. The country currently relies on substantial imports, exclusively from Russia. Total imports reached 8.54 Mtoe (8.54 Gm^3) in 2007. Roughly 20% of that volume was supplied by new companies (Gaz de France, Ruhrgas and EMFESZ), but the gas itself is entirely Russian in origin. Import dependency already exceeds 80% and this is set to increase to 85% by 2020, parallel with declining domestic gas production. At present more than 3.5 million Hungarian households are connected to the low-pressure gas network, domestic household consumption occupying a share of over 80%, which contributes to the very high seasonal variation in demand. Industry consumes relatively little natural gas and the chemical (and other) industries account for only 10% of total gas consumption, whilst power plants used an additional 15%. Only the latter consumer could act as a buffer in the event of a supply interruption.

Based on an analysis of production, import, and consumption statistics, one can conclude that it is indispensable to increase the buffer (*underground gas storage*) capacity and to diversify import sources by extending the high-pressure, international pipeline network. Underground storage plays a very important role in Hungary, overcoming seasonal consumption fluctuation and allowing the country to cope with any crises in the transport network. Currently, five underground storage facilities operate in the country with 3.38 Gm^3 mobile and 4.64 Gm^3 cushion gas capacity (*Figure 120*). Although their maximum release in winter is potentially 47.5 Mm^3/d, additional capacity is needed to meet future demand.

Another element of a reliable and safe gas supply network is a high quality and well connected international and domestic *pipeline network*. The prime pipeline connects Hungary with Ukraine, Austria, and Serbia (*figures 120 and 122*). The Ukrainian pipeline is the main import route with a capacity of 10 Gm^3 per annum, while the Austrian branch (with capacity of 4.4 Gm^3 per annum) is essentially only used to balance the system during times of high demand. Since the government has an ambitious goal to diversify imports, further international connections are currently under discussion, including the Blue/South Stream and Nabucco pipelines (each with 30 Gm^3 per annum capacity) and the construction of an LNG terminal on the Croatian island of Krk. The domestic medium- and low-pressure pipeline network provides reliable access for industry and all residential areas. Network construction began in 1963 and has been gradually improved ever since, reaching a length of 5,194 km in 2005 and includes five high capacity gas-turbine compressor stations. Unfortunately the average age of the system is over 25 years, a result of which continuous inspection, maintenance, and replacement are everyday tasks of network operators.

In three locations (Répcelak, Hahót and Budafa), Hungary has relatively large geological reserves of good quality ***carbon dioxide***. In 2007, the reserves were estimated to be 46.3 million tons, and its recoverable amount was 30.7 million tons. Annual production is currently about 150 Mm^3 per annum; the food industry and health-care sector use the majority of this. Previously, the abundant natural supplies provided an easy option of using CO_2 for enhancing oil recovery, increasing displacement efficiency and improving gravity drainage in the Kiscsehi and Nagylengyel oil reservoirs.

Extensive use of crude oil and natural gas in Hungary and the high import dependency of the country have turned the energy sector's attention to ***unconventional hydrocarbons***. The Hungarian potential of *methane* captured by coal seams is promising. In the Mecsek Mountains,

the coal seams may contain great quantities of methane. The joint project of the Hungarian and American geological surveys discovered that at a minimum 140–170 Gm^3 (and by optimistic assessments 240–280 Gm^3) of methane may exist in the coal left behind in disused mines. There is a good chance in the future of recovering 30–50 Gm^3 of methane and a similar proportion of CO_2 from the flue gases of power stations.

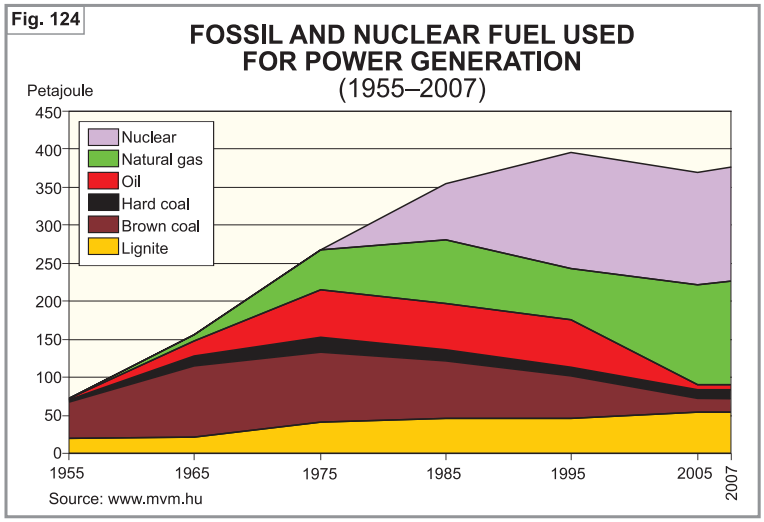
Recently a foreign company reported that whilst exploring deep geological formations in the *Makó* trough, huge *unconventional gas resources* were discovered between 4,000 and 6,500 m. The Basin Concentrated Gas Accumulation (BCGA) was first estimated to be around 400–600 Gm^3, but a later report put the figure at 1,200 Gm^3. The official announcement aroused unprecedented attention, since discoveries of this magnitude would make Hungary not only self-sufficient in natural gas, but turn it into a net exporter in Europe. One can conclude that such reserves have enormous energy and economic potentials as their total resource could exceed several times over, the amount of conventional natural gas in Hungarian reservoirs. The expression, "what is unconventional today, will be conventional tomorrow" leads us to predict that unconventional hydrocarbons will be available to all sectors of the country at a reasonable price in the decades to come.

Energy Supply

Development Trends

Coalfields served as the energy source for the socialist industrialisation that was gathering momentum in the *early 1950s (Figure 124)*. Most of the factories involved in the processing of raw materials and manufacturing (e.g. iron and steel, chemicals, construction materials, machinery industries, etc.) were spatially confined to the coal mining regions. Following the arrival of cheap crude oil imported from the USSR, the share of hydrocarbons in the energy sector was growing rapidly *in the 1960s*, but due to the oil price explosions of 1973 and 1979, efforts were also made to utilise domestic coal reserves (the so called Eocene and Liassic programmes) in the *1970s and 80s*. Efforts were also made to find greater uses for natural gas, to increase the import of electricity, and to create an option for the use of nuclear power (Paks Nuclear Power Plant). A drop in energy consumption occurred after the regime change, due to the economic collapse experienced by all Eastern Bloc countries and the closure of a mass of uncompetitive and energy-intensive industrial sites. Declines eventually stabilised total consumption at an annual level of approximately 1,100 PJ. A reduction in the use of domestic resources resulted in a parallel rise in the ratio of imported power, from 50.7% to 67% of energy consumption, between 1990 and 2007. Simultaneously, industry's share of consumption diminished, with a concurrent growth in residential and local public use.

Fig. 124



Faced with such circumstances, the current *priorities of govern-*

ment energy policy when addressing issues of reliability and sustainability of the energy supply are: energy saving and efficiency improvements, reducing dependency on imports and natural gas, diversification of import sources, a higher use of lignite reserves in the energy balance, a further emphasis on the long-term use of nuclear power, increasing participation of renewable energy sources and, finally, closer attention paid to environmental issues.

Electricity

The first thermal power station for the generation of public electricity began working in Temesvár (Timişoara, today Romania) in 1884. Later several plants were built separately from one another, which supplied electricity to two fifths of settlements by 1945. The first high voltage (100 kV) transmission line was opened between Budapest and the Bánhida Power Plant (Tatabánya) in 1932. Following World War II, the capacities of these thermal power stations rapidly increased and the network was extended to meet the considerable growth in demand for electricity. All settlements had been connected to the electricity grid by 1960. Important changes in the fuel supply of the hitherto coal-fired thermal power plants were brought about by the introduction of the hydrocarbon-fuelled Dunamenti (Százhalombatta) and Tisza II (Leninváros/ Tiszaújváros) power stations in the 1970s, by Paks Nuclear Power Plant (NPP, commencing operation in the 1980s), later by the widespread exploitation of gas turbines, biofuels (biomass) and the harnessing of wind power over the past two decades. Such changes are also visible in the proportions of energy sources used for electricity generation between 1990 and 2007. The share of brown and hard coal decreased from 22.2% to 3.3%, parallel with an increase of lignite (from 9.5% to 15.2%) and natural gas (from 16.3% to 37.9%). The contribution of nuclear energy (36.8%) has remained – similar to that of natural gas – extremely important.

The total generating capacity of ***domestic power plants*** is 9,139.8 MW, out of which 85.5% is produced by the major power installations (over 50 MW). Besides Paks NPP the largest power stations operate in Central and North Hungary and North Transdanubia (e.g. Százhalombatta, Visonta, Tiszaújváros, Budapest, Oroszlány, Tiszapalkonya and Berente) (*Table 31, Figure 125*). The power stations using ***lignite and brown coal*** are located near their fuel deposits (e.g. Visonta, Oroszlány and Berente), the others *using* ***hydrocarbons*** can be found adjacent to gas and oil pipelines and near their largest consumers (e.g. Százhalombatta, Tiszaújváros and Budapest). Additionally, 210 smaller electricity producers and many autoproducers are operating, which are not part of the Hungarian national grid (e.g. BorsodChem in Kazincbarcika and Dunapack in Budapest). The installed capacity of the biggest ***hydroelectric*** *power plants* is below 30 MW (Kisköre and Tiszalök). The largest power stations using ***biomass*** as their fuel are in Pécs (Pannon Green Ltd) and in Ajka (Bakony Bioenergy Ltd). The 'FKFV–HUHA' power station located in Budapest, is fuelled with ***municipal waste*** and can generate 24 MW. ***Wind farms*** (10–24 MW) were recently established in North-West Transdanubia, owing to favourable climatic conditions (e.g. Levél, Sopronkövesd, Nagylózs and Mosonmagyaróvár).

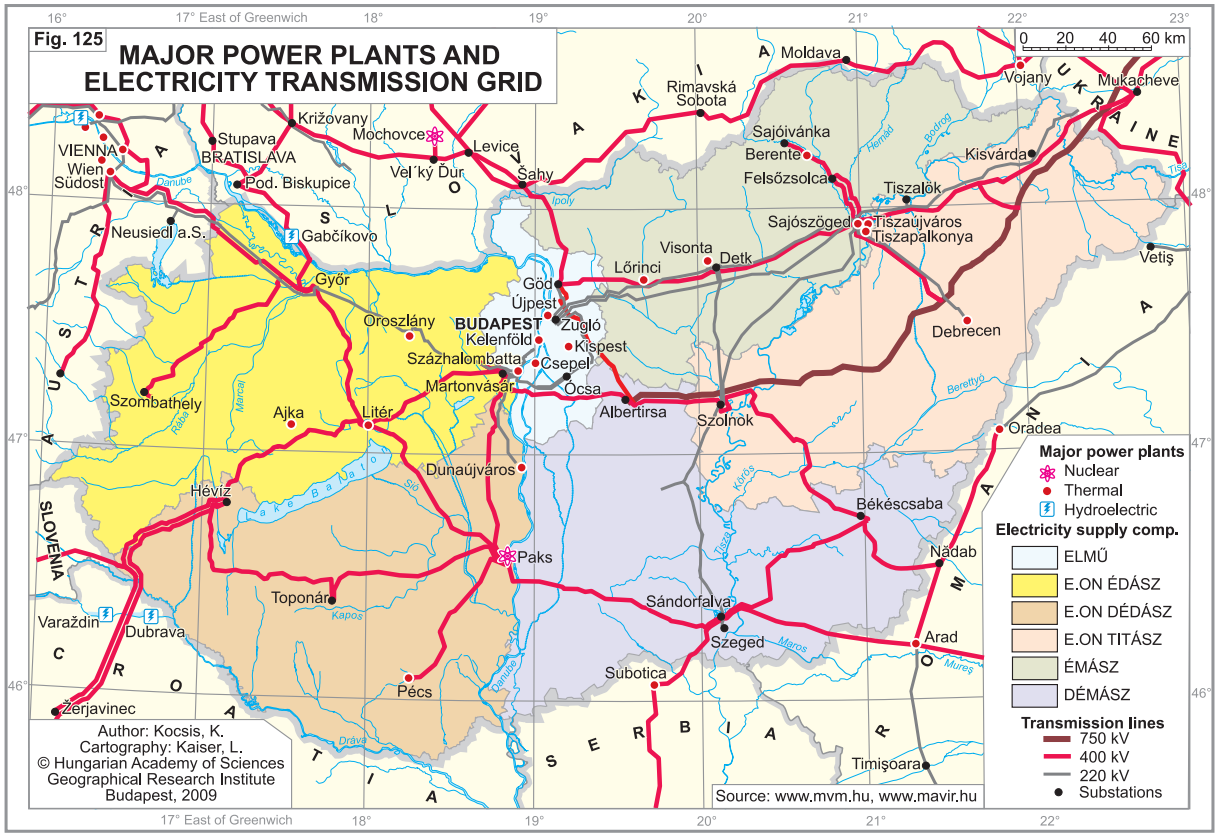
The ***Paks nuclear power plant*** makes an important contribution to the safe, cheap and clean energy supply of Hungary. Paks NPP is located in the central part of Hungary about three kilometres south of the town of Paks on the west bank of the River Danube. There are four WWER-440/V213 type reactor units at the site. Construction of the plant commenced in 1974 and was completed in 1987, representing the largest industrial project of 20th century Hungary. The power station is owned by the MVM (Hungarian Power Company), together with its parent company State Asset Management Ltd. *(Table 32)*.

At Paks NPP a comprehensive programme of safety upgrades have been implemented, which resulted in a decrease to the annual occurrence of core damage; since reduced to a level

Table 31. ***Major power plants (2008)***

Name	Settlement	Installed capacity (MW)	Fuel
Paks NPP	Paks	1,940.0	nuclear
Dunamenti II.F, G1, G2	Százhalombatta	1,736.0	hydrocarbon
Mátrai	Visonta	950.0	coal, biomass
AES Tisza	Tiszaújváros	900.0	hydrocarbon
Csepel GT	Budapest	396.0	hydrocarbon
Oroszlányi	Oroszlány	240.0	coal
Tiszapalkonyai	Tiszapalkonya	200.0	coal, biomass
Kelenföldi	Budapest	185.9	hydrocarbon
Lőrinci GT	Lőrinci	170.0	fuel oil
Borsodi	Berente	136.9	coal, biomass
Pannon	Pécs	132.5	hydrocarbon
Sajószöged GT	Sajószöged	120.0	fuel oil
Litéri GT	Litér	120.0	fuel oil
Újpesti	Budapest	110.0	hydrocarbon
Kispesti	Budapest	110.0	hydrocarbon
Ajkai	Ajka	101.6	coal
Bánhidai	Tatabánya	100.0	hydrocarbon
Debrecen GT	Debrecen	95.0	hydrocarbon
ISD Power	Dunaújváros	69.0	hydrocarbon

Source: www.mavir.hu



of 10^{-5}/a. Operation of the plant is very smooth and there were no reactor scrams in 2008. An incident occurred in 2003 at Unit 2, which resulted in damage to the fuel assemblies inside a cleaning tank. The incident was unrelated to the safety of the basic technology of Unit 2 and there was no environmental harm.

The capacity of the plant has been expanded, first through an increase in thermal efficiency, and more recently by an 8% increase in the thermal power of the reactor, implemented via the employment of modernised fuel assemblies and some minor modifications, all the while safety margins being maintained.

Table 32. ***Basic technical data of the Paks Nuclear Power Plant***

Unit	Connected to the grid	Net capacity at start of operation, MW	Net capacity before recent power up-rate MW	Capacity in 2008, MW	
				Net	Gross
1	28.12.1982	410	437	470	500
2	06.09.1984	425	441	473	500
3	28.09.1986	427	433	443	470
4	16.08.1987	425	444	473	500

Source: www.atomeromu.hu

In 2008, the NPP produced 14,814 GWh, contributing a 37.2% share to the national electricity output. The cumulative load factor of the plant is 84.39%. The cheapest electricity in Hungary is generated at Paks NPP, and since a doubling in fuel prices will cause less than a 20% increase in production costs, the cost base is very stable. Two years worth of nuclear fuel is stockpiled, to ensure the plant's ongoing operation in the event of short-term disturbances in the fuel markets. Alternative fuel supply might be ensured.

Paks NPP has practically no greenhouse gas emissions. Any replacement technology would result in greater 'whole-life' emissions, e.g. an equivalent power plant to Paks NPP, running on natural gas, will emit more than 5 million tons of CO_2 annually. The ongoing operation of Paks NPP causes a negligible environmental effect with respect to radioactive releases. In 2008 the plant used 0.25% of its release limits. The extra dose relevant to a critical group of the public due to plant emission was 58 nSv in 2008, equivalent to only 10 minutes worth of exposure to natural background radiation. The sole environmental burden results from the release of cooling water into the Danube. Results from the environmental monitoring programme that analysed the environmental impact of the prolonged operation of Paks NPP, showed no adverse effects on the environment after 20 years of operation.

Nuclear waste generated by the plant, including radioactive waste, is collected, classified and contained. The facilities necessary for the processing and storage of solid and liquid radioactive waste are available at the plant. Spent fuel, after five years of cooling at the plant, is stored for 50 years in the intermediate on-site storage facility.

One of the options for ensuring the mid-term ongoing reliable supply of clean and cheap energy, is an extension to the operational life of Paks NPP. The life expectancy of the units at Paks is 30 years, expiring between 2012 and 2017. Starting with a feasibility study in 2000, systematic engineering work has started on secure an extension to their operation life, by an additional 20 years. Environmental authorisation was received back in 2006. In 2008, plans for its extension were submitted to regulatory scrutiny and the formal licensing for the extension for Unit 1 is anticipated to be received by the end of 2011, and later for other units.

An option for the development of Hungary's power industry with a view to the longer perspective, is the construction of a new plant at the Paks site, with capacity twice 1,000 to 1,600 MW between 2020 and 2025. The new plant would secure the power supply and make an essential contribution to electricity generation for a minimum of 60 years, at competitive prices, with practically zero emissions and negligible environmental impact. The new project would stimulate the development of the scientific, engineering and construction industries in Hungary, creating thousands of jobs for more than a decade. The experience and skills for its safe operation are already present in the country; the legal framework is naturally pre-existing for the regulatory oversight of the new plant. The Paks proposals have been thoroughly investigated, the site already possesses the necessary infrastructure and offers opportunities to synergise with that already established.

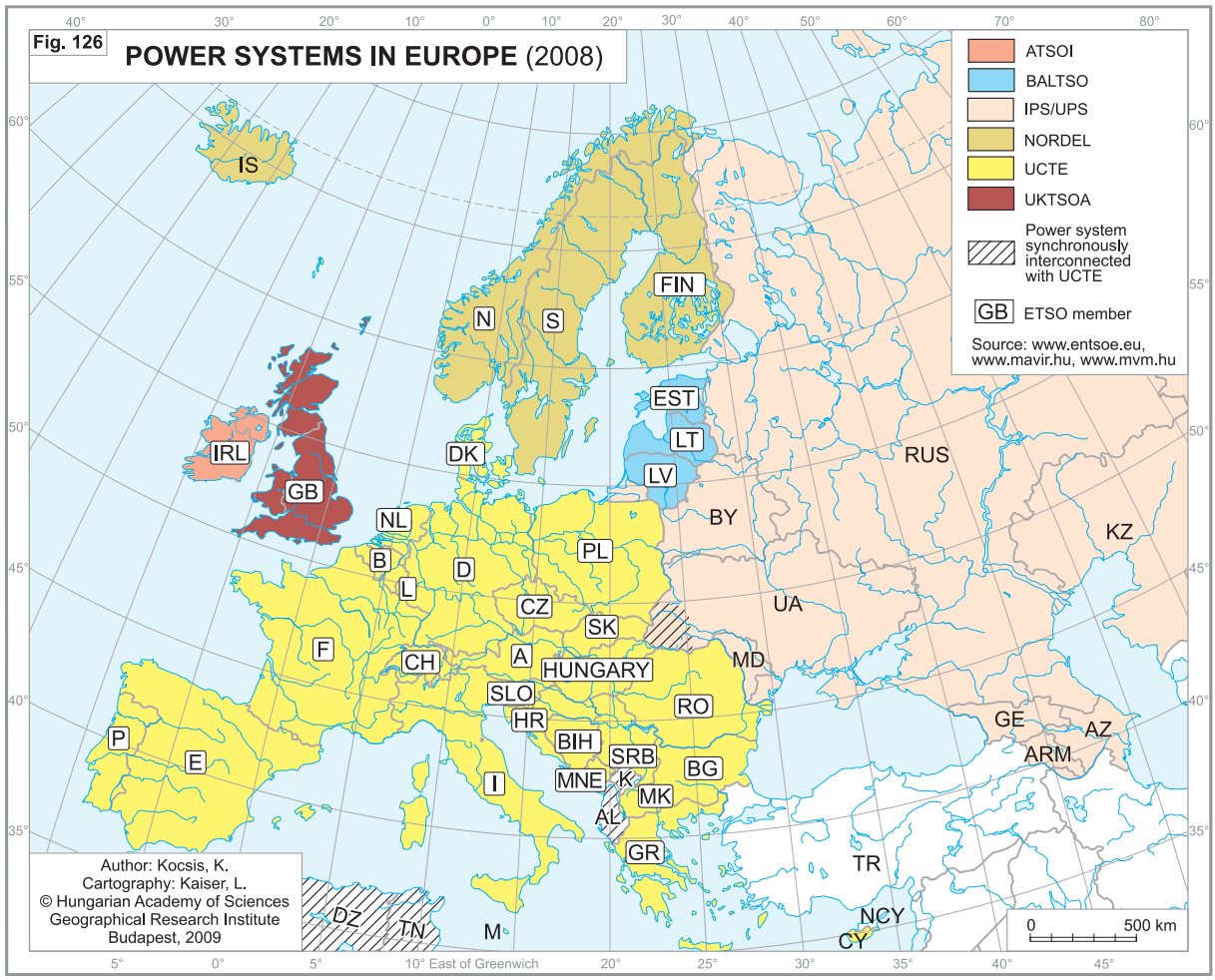
For many years, the public acceptance level of Paks NPP has been over 70%. In November 2005, the Hungarian Parliament endorsed plans to extend the life expectancy of units 1–4 at Paks by 20 years. Construction of a new plant on the Paks site is also supported by the public and in March 2009, the Hungarian Parliament gave its approval in principle for the preparation of the new project.

Foreign investors own 38.9% of ***companies operating power plants*** (licence holders in electricity generation) of 50 MW and higher. Out of them the Dunamenti, Mátrai and AES Tisza

Power Plant Ltd are the most important. MVM Power Trade Zrt. (Hungarian Power Company) and MAVIR Zrt. (Hungarian Transmission System Operating Company) are exclusively in the hands of Hungarian investors.

Electricity production in the country increased from 1.4 TWh in 1938 to 28.4 TWh in 1990 and further to 39.9 TWh in 2007. However, this amount is not sufficient for the total ***electricity consumption*** of the country (54.3 TWh in 2007), which includes domestic consumption, private power plants, network and transformer losses, as well as electricity exports. The Hungarian power network has been a net ***importer*** of power since 1940, the share of which in the total sources of electricity reached 26.3% in 2007. Since 2005, electricity transit towards the Balkans has played a significant role in the increase of imports, and even more of export. The electricity import of 14,278 GWh (2007) arrives mainly from Slovakia (9,058 GWh), Ukraine (3,915 GWh) and Austria (1,455 GWh), whilst export deliveries (10,291 GWh, 2007) are mostly directed to Croatia (6,536 GWh) and Serbia (3,430 GWh).

Hungary (together with Poland, Slovakia, Romania and Cyprus) became a full member of the ***ETSO (European Transmission System Operators)*** alliance in 2004, which supplies more than 490 million people with electricity through high voltage transmission lines totaling 290,000 km in length. ETSO, as an international association, incorporates four regional organisations (NORDEL, TSOI, UCTE and UKTSOA) which are the result of European efforts to maximise the reliability of the electricity system and the quality of supply, in order to optimise the use of primary energy and capacity resources (*Figure 126*). The Hungarian power generation industry joined the largest organisation – ***UCTE (Union for the Co-ordination of Transmission of Electricity)*** – in 1995, which subsequently also accepted MVM Zrt (in 1999) and MAVIR Zrt (in 2001). In UCTE, Hungary became part of North control block (RWE, with the accounting centre in Brauweiler, Germany). From 1 July



2009 on the ATSOI, BALTSO, ETSO, NORDEL, UCTE and UKTSOA has been fully integrated into the new established ***ENTSO-E*** (European Network of Transmission System Operators for Electricity).

The link between producers and consumers is established through the ***transmission and distribution network***, the length of which is 161,629 km (2007). More than two thirds of the system was constructed after 1955. The first 220 kV transmission line started operating in 1960, whilst the first 400 kV line was launched in 1970; a single 750 kV line started operating between the Ukrainian Vinnitsia and the Hungarian Albertirsa in 1978. The length of high voltage transmission lines is 3,455 km, of which 8% are in the 750 kV category and 58% in the 400 kV category.

In 2007, nearly 28 TWh of electricity was generated for domestic consumers by the ***electricity supply companies***. Since privatisation in 1995 and 1996, 95.1% of electricity distributors and public utility suppliers are in the hands of foreign (mostly German) investors. *E.ON Hungária Zrt*. is a subsidiary of the multinational E.ON Energie (Europe's largest private supplier of electricity), and is a leader in the country's power supply, with responsibility for the provision of electricity to Transdanubia and the North Alföld. 53% of electricity sold was consumed in the highly developed regions of the country, supplied by ELMÜ Nyrt. (Budapest area) and E.ON ÉDÁSZ Zrt. (North Transdanubia) *(Figure 125)*.

An overwhelming proportion of the Hungarian electricity infrastructure is obsolete being more than 30–50 years old. The average age of large power plants is 24 years. According to the opinion of reliable sector-based professionals, an enlargement of 4,500–6,000 MW would be necessary in the forthcoming 10–15 years. With respect to technological and environmental considerations, and in order to ensure reliability in the power supply, such development should be primarily reliant on nuclear fuel or lignites. There are also opportunities for an increasing contribution of hydroelectricity and other renewable sources.

Industry

Hungarian industry, during its 150 year history, has witnessed numerous changes and has had to face many serious challenges. The political, social and economic circumstances have changed frequently, not only at a domestic level, but also on a global scale.

Industrialisation in Hungary started while it was still part of the Austro-Hungarian Monarchy, in the second half of the 19th century. Due to its rapid development, industry became an integral part of the economy by the early 1900s, with notable spatial characteristics. World War I disrupted this dynamic development, resulting in the disintegration of the Monarchy, the loss of previously Hungarian territories, a decline in population and many other consequences. Industrialisation continued between the two world wars, although at a slower rate, but became severely hit by World War II. From the onset of the socialist period, industrial development was characterised by a rapid and extensive growth, with an emphasis on heavy industry. During the somewhat hasty industrialisation, it was predominantly branches with a sufficient domestic supply of raw materials – mining and metallurgy – which grew. Starting in the early 1970s, the country saw an intensive phase of development, resulting in an improvement in the quality of products and a rise in technological standards. Despite this, a deep crisis beset the sector from the 1980s onwards, which was mirrored by the entire economy. The basic shortcomings of Hungarian industry had become evident (e.g. low technological capabilities, outdated product palette, poor quality of produce, etc.). Although there were attempts to overcome these towering difficulties, a decisive turn came only after 1989, following which Hungarian industry managed to overcome its backwardness, and integrated into the world economy. The main industrial branch is the machinery industry.

Despite the changes that had taken place in industry between 1989 and 2007, its position within the overall economy has hardly changed over the past 20 years (*tables 33 and 34*).

Table 33. ***Selected indices of industry within the Hungarian economy (1990–2007)***

Share of industry within (%)	1990	2007
Incorporated enterprises	21.0**	12.1
Employees	30.7	24.3
Enterprises with foreign interest	17.2*	13.3***
Investments	37.4	33.7
Gross domestic product	32.3	43.6
Export	83.2	60.5
Gross value added	29.1*	31.2

*1991, **1992, ***2006.
Source: Hungarian Statistical Yearbook, 1991, 1992, 2008, Regional Statistical Yearbook, 1990, 2008.

Table 34. ***Trends in Hungarian industry (1990–2007)***

Indicators	1990	2007
Number of incorporated enterprises	14,105*	33,087
of which are limited liability companies	11,329	30,713
of which are joint stock companies	578	866
Number of enterprises with foreign interest	4,066**	3,441
Amount of all investments in industry (million HUF)	104,794	1,316,658
Number of enterprises with less than 50 employees	11,240	49,654
Number of enterprises with more than 250 employees	872***	517
Number of all employees	1,282,185	803,216
of which occupied in the machinery industry	421,554	273,304
of which occupied in the light industry	283,246	134,410
of which occupied in the food industry	198,890	110,890

*1992, **1994. ***Number of enterprises with more than 300 employees.
Sources: Hungarian Statistical Yearbook, 1990, 1992, 1994, 2008. Regional Statistical Yearbook 1990, 1998, 2008

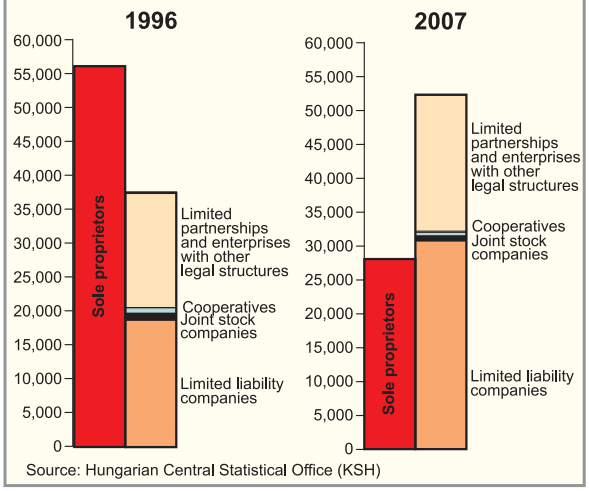
Industry remains an important sector of the Hungarian economy, and this is unlikely to change in the near future, despite an anticipated decline owing to the current economic crisis. The significance of industry is indicated by the presence of numerous multinational companies which make up almost half of the top 500 companies in terms of net sales revenue, such as MOL, Audi, Nokia, Philips, GE, Suzuki, etc. They are also the country's top exporters.

The quick recovery and dynamic development of Hungarian industry has for a long time been seen as a success story in Central Europe. More recently growth has slowed and the former 'champion rider' could be seen as a lagman. At present Hungary is facing serious difficulties, which may have unpredictable consequences.

Organisational Forms and Company Size

Since 1989 the ***circle of industrial actors*** has widened due to the establishment of many new, mainly small enterprises, whilst most of the big companies that were utilising outdated technologies, have been closed. Currently more than 52,000 enterprises operate in industry, which accounts for around 10% of all ventures in the economy (*Figure 127*).

Fig. 127 NUMBER OF INDUSTRIAL ENTERPRISES BY LEGAL FORM



Source: Hungarian Central Statistical Office (KSH)

The most significant proportion of ***industrial enterprises*** (47%) can be found in Central Hungary. This is due to several factors, such as its central location, developed infrastructure, qualified labour force, large consumer market, huge capital concentration, more innovative population.

Not only have the number of industrial enterprises increased between 1990 and 2007, but also their ***organisational form*** has profoundly changed. At the beginning of the 1990s, the traditional organisational forms were replaced by new structures, better suited to their activities and the new challenges. Of them, the limited liability company (Kft.) is the most frequent. In fact, 59% of all industrial corporations and unincorporated enterprises have chosen this organisational form. This can be primarily explained by the relatively small initial capital that is required for its foundation and the absence of restrictions on who can establish one.

In the 1990s the ***internal structure*** of old state companies was also reorganised. The subsidiaries that were operating successfully became independent business units, at the same time the unprofitable units were shut down. The decrease of industrial sites has also contributed to the diminishing of organisational dependency, and thus, spatial dependency has also been reduced. The primate role of Budapest has somewhat decreased and the position of some county seats (e.g. Győr and Székesfehérvár) has strengthened, following the establishment of several company headquarters there.

The first half of the 1990s saw a marked shift in favour of small and medium sized enterprises, as the number of firms with less than 20 employees increased rapidly. As a consequence, a much more balanced and proportionate domestic structure of companies has emerged. By 2007, 95% of industrial enterprises had less than 50 employees, with a low amount and proportion of industrial enterprises employing more than 250 workers. This pattern shares strong similarities with those in developed countries, but domestic small industrial enterprises are still lagging behind them in terms of skills, technological assets and competitiveness.

Foreign Capital Investment

Foreign capital has played an active role in the ***privatisation of industrial firms***. From 1989, 35–50% of annually invested foreign capital has been directed towards industry, where the established enterprises were fewer in number, but more capital-intensive than in any other sector of the economy.

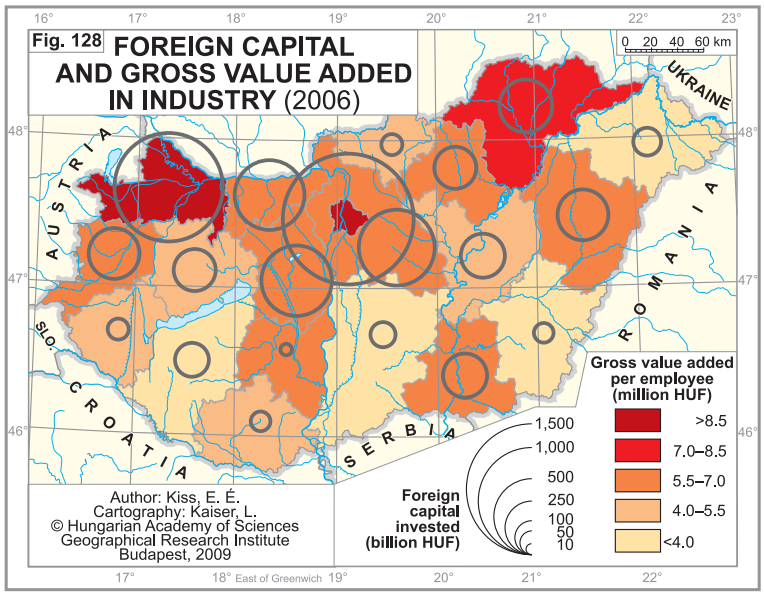
In the first half of the 1990s, Hungarian industry proved to be highly attractive for for-

eign investors as Hungary was a country leading reform in the region. The political situation was stable, and the labour force was well qualified, but comparatively cheap. The number of enterprises with foreign interest increased rapidly, and their number exceeded 4,300 by 1997. However, by the end of the first decade of the 21st century, interest from abroad had dropped considerably. This is attributable to the global economic crisis and bleak domestic political outlook. Also of relevance is that the privatisation process has been completed, and rival East European countries have shown rapid development and are fast closing on both Hungary and ultimately, the West. As a consequence, the number of enterprises with foreign interest has diminished in almost all branches. In 2006 3,441 enterprises with foreign shareholders operated in Hungarian industry, representing 13% of such Hungarian enterprises. Most of them are already 100% foreign-owned. Between 1994 and 2006, the share of foreign capital had increased in all enterprises with pre-existing foreign interest.

The most ***important investors*** are the Germans and Austrians, due to geographical proximity and historical relations. Investment by the Americans, Dutch, British, French and Swiss is also considerable. From Asian countries, the largest amount of capital arrived from Japan and South Korea.

Foreign capital has been invested primarily in engineering (electronics and car manufacturing), the chemical and food industries, along with printing and publishing. Either new factories were established (e.g. in the case of the car industry) on greenfield sites, or existing industrial locations that were in a viable condition (e.g. in the food industry) were targeted. This kind of duality has also affected the spatial pattern of industry. The new enterprises were located mostly in the northern part of Transdanubia, where several subsidiaries of well-known automotive companies (Ford, Audi, Suzuki and Opel) were established, while the location of older industrial companies did not change.

Geographically, the ***primary targets of foreign investment*** were in Budapest and its environs. About 40% of enterprises with foreign interest can be found in this region, which is also where the bulk of foreign capital has been invested. North Transdanubia was another attractive region for foreign investors, because of its good transport links, a developed infrastructure, geographical proximity to export markets, a skilled labour force, and its knowledge of the German language, among others. These two regions together comprise almost one third of the country's territory, where 69% of enterprises with foreign interest are located, representing 76% of all foreign capital invested in industry. The apparent conclusion is that foreign capital is highly concentrated spatially and this has not changed over the past 20 years. The geographical distribution of foreign capital is an enduring phenomenon, which has led to spatial duality. Central Hungary and North Transdanubia are also the regions where the highest rates for gross value added per employee (in industry) are produced, as they are the most industrially developed parts of the country (*Figure 128*).

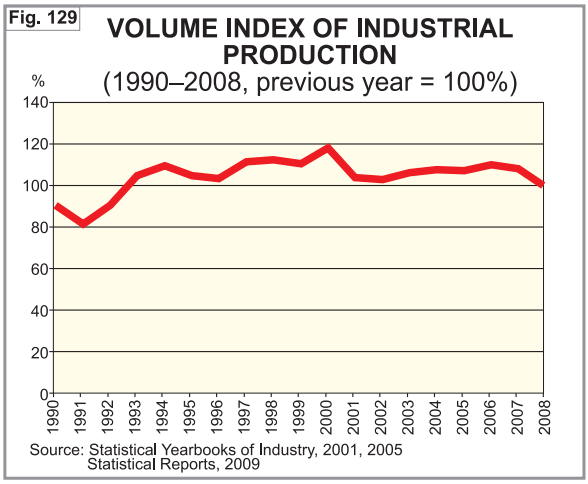


The influx of foreign capital has had significant and mostly favourable effects on Hungarian industry. It has contributed to industrial restructuring, a spatial transformation and to the modernisation of the sector. By 2007, more than 40% of industrial employees worked for enterprises with foreign interests, which is a high ratio when compared to other sectors of economy. Generally, industry has developed faster in the regions with a higher share of foreign investment.

Industrial Production

The passage of the past 20 years for industry is well represented by the ***change in industrial output***. At the start of the 1990s, there was a considerable decline in industrial output followed by a slow recovery from 1993 onwards. In the second half of the 1990s, a dynamic increase could be observed, which lasted until 2001, after which industrial output grew at a lower rate (by 3–7%). However, over the course of 2008 it fell by 1.1% and even worse is that a further decrease in industrial output (by some 3–4%) is predicted for 2009. This is the direct consequence of the decrease in demand owing to the global economic crisis (*Figure 129*).

Fig. 129



Source: Statistical Yearbooks of Industry, 2001, 2005
Statistical Reports, 2009

The change in industrial output indices, relative to 1989 (considered the base year), was similar across most of the ***counties of Hungary***. The nadir was in 1992–1993, when industrial output had fallen to two thirds or a half of the base year's figure. After this, industrial output started to increase in each county, but to different extent. Between 1989 and 2007, primarily due to considerable foreign investment, the increase in output was substantial in the counties of Komárom-Esztergom (12-fold), Fejér (6-fold), Győr-Moson-Sopron and Vas (4–4-fold).

Table 35. ***Output of principal manufactured products (1990–2007)***

Products	1990	1995	2007
Crude steel (thousand tons)	2,963	1,865	2,317
Buses (units)	7,994	1,207	314
Television receivers (thousand)	492	274	9,696
Radio receivers (thousand)	66	2	2,368
Internal combustion engine for cars and motorcycles (units)	-	-	2,337,680*
Refrigerators and freezers for household purposes	438,228	-	2,909,786
Petrol (thousand tons)	2,606	2,356	1,394
Plastic basic materials (tons)	614,547	763,803	931,056
Nitrogenous fertilisers in active form (tons)	469,846	177,903	283,639*
Composition of plant protectives (tons)	55,982	19,427	8,486
Sawn wood from broad-leaved trees (thousand m^3)	24	102	261
Paper and cardboard (thousand tons)	443	316	117
Varnished wardrobes (thousand)	1,113	379	105
Footwear (thousand pairs)	24,306	11,401	6,610
Cotton and cotton-type fabrics (million m^2)	222	68	13
Pork on the bone (tons)	496,576	253,176	248,341
Slaughtered poultry (tons)	232,309	187,659	210,266
Salami (tons)	13,945	13,691	11,244
Sausages (tons)	40,024	33,432	42,057
Milk for consumption (thousand litres)	831,275	582,877	475,940
Butter (tons)	38,819	15,240	4,243
Flour (thousand tons)	1,249	1,234	769
Bread (thousand tons)	673	293	253
Sugar (thousand tons)	512	480	357*
Chocolate products (tons)	33,639	19,906	12,916
Wine from grapes (thousand litres)	169,192	99,230	168,758
Draught beers (thousand litres)	991,783	769,744	756,570

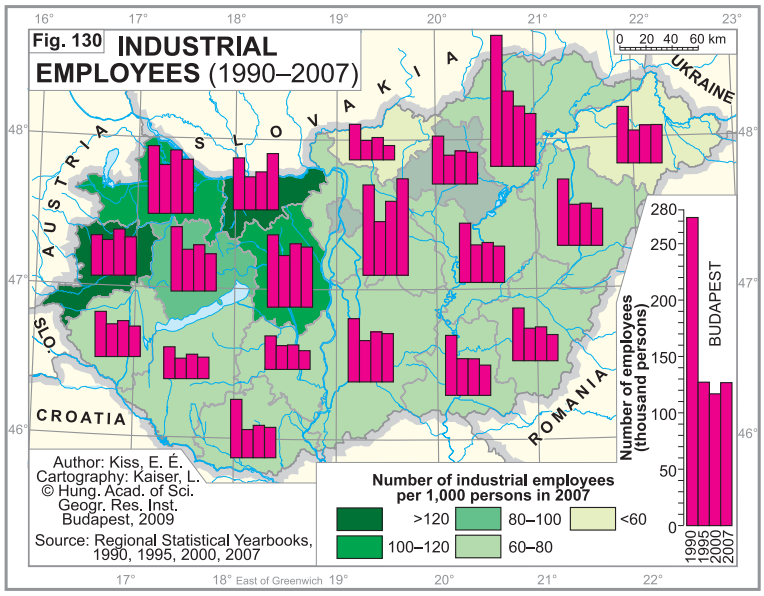
*2006, - Not available.
Source: Statistical Yearbooks of Hungary, 1995, 2007.

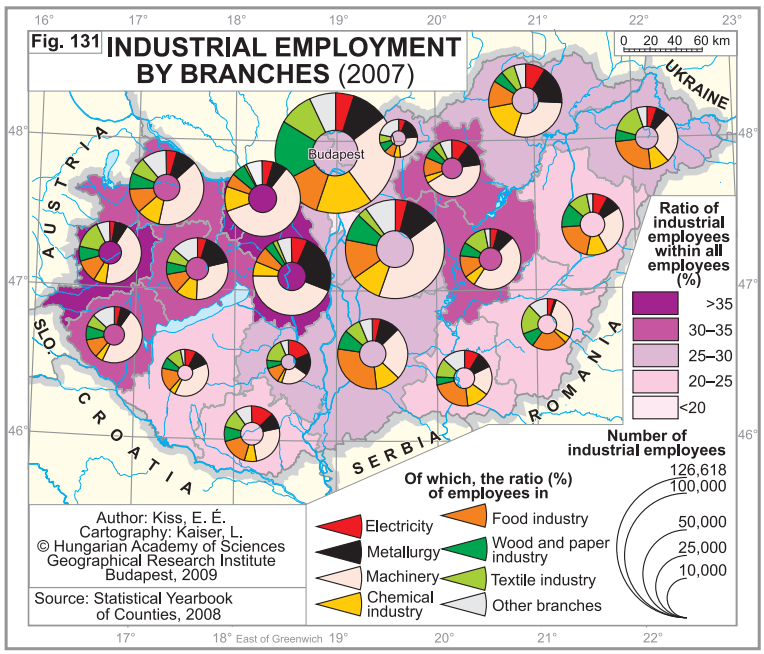
Komárom-Esztergom is the only county where industrial production has increased continuously between 1993 and 2007. Nokia and its local suppliers have played a key role in this. According to the most cautious estimates, Hungarian industrial output is set to increase again only after 2010.

The change in output of some of the products of the manufacturing industry between 1990 and 2007 is also a proper indicator of the general performance of Hungarian industry (*Table 35*).

Industrial Employment

In contrast to the number of industrial firms, which continuously increased after 1989, the number of industrial employees actually decreased. In 1990, almost 1.3 million people worked in the sector, whilst by 1995 it only employed 750 thousand. Later their number began to increase and by 2007 it exceeded 800 thousand.





The decline shown by industrial employment was relatively modest in those counties where industrial production was increasing very rapidly. Thus, it is no accident that by 2007 the number of industrial employees per 1,000 persons was the highest in the northern part of Transdanubia (*Figure 130*).

Deindustrialisation was the most far advanced in the counties of Borsod-Abaúj-Zemplén, Nógrád and Baranya, along with Budapest, due to the collapse of local heavy industries, and a dynamic development of the service sector.

Since 1989, the number of employees in all ***branches of industry*** has considerably decreased. The sharpest drop – from 84,000 down to 5,000 persons – has taken place in the extraction industries, which can primarily be explained by the almost complete closure of ore and coal mining. Light industry, the food industry and to an extent the machinery industry has also lost a considerable part of their labour force.

Not only did the number of industrial employees decrease dramatically between 1990 and 2007, but their share within the employment market diminished, as well. In 1990, 40–50% of all employees worked in the industrial sector in each county, but by 2007 only

22–44% continued to be engaged in industry. The most radical decrease was experienced in Budapest, where the ratio of industrial employees fell from 43% to 13%. In spite of this, the concentration of industrial employees still remains the highest in the capital city (*Figure 131*).

In 2007 the ***machinery industry*** was the largest employer, representing 30% of all industrial employees. This branch has developed rapidly over the last decades due to new investments, particularly in the car industry and electronics. Currently, an overwhelming part of industrial employees work in the machinery industry in each county. The food industry, the manufacture of basic metals, along with the textile industry are also significant employers.

In 2007, the food industry employed the largest share of industrial workers in Bács-Kiskun County (29%), as did textiles and electricity generation in Tolna County (18% and 19%), woodworking in Budapest (17%), chemicals in Borsod-Abaúj-Zemplén (17%), metalworking in Fejér (24%) and the machinery industry in Komárom-Esztergom (58%).

By the end of 2008, the ***number of employees*** engaged in industry had decreased by about 20–30 thousand, and in 2009 a further decline can be expected, owing to the unfavourable economic trends. The reduction has mostly affected the northern part of Transdanubia where consumer goods (cars, mobile phones, electronics, refrigerators, etc.) are mainly produced. Consequently, the current economic crisis has hit much harder the enterprises located in the developed industrial areas of the country than those in the less industrialised regions.

Structural Transformation

Over the last 20 years the structure of Hungarian industry has considerably changed, owing to a combination of different challenges: a crisis in traditional industrial branches; EU-membership resulting in new regulations and agricultural quotas; the emergence of the cheaper Asian and Eastern European labour force; increased competition; high taxes, etc. The relatively balanced branch structure of socialist industry has turned into a dominance of the ***manufacture of machinery and equipment***. The emergence of the automotive industry and the fast development of ***electronics*** have greatly contributed to this. At present these branches are highly concentrated spatially, mostly in North Transdanubia. They also determine the spatial pattern of post-socialist industry (*Figure 132*).

The considerable decrease in the importance of ***traditional heavy industrial branches*** (mining and metallurgy), as well as other declining branches (textile and leather industries), have contributed to the structural transformation. Over the recent decades, several industrial branches (e.g. the manufacture of weapons and the photographic industry) have disappeared, or their divisions, as part of larger enterprises, were closed down. Before 1989, iron and steel and aluminium industries were important within metallurgy. The latter has completely disappeared, and the former is now represented by a sole smelter, Dunaferr located in Dunaújváros which has managed to continually adjust to the new challenges. The dramatic decline of iron and steel manufacturing can be explained by the decrease in domestic demand, the bankruptcy of the primary customers and by the availability of cheaper imports from surrounding countries.

Besides the machinery industry, certain branches of chemicals (rubber and pharmaceuticals) have developed more dynamically in the last decades. There was a high spatial concentration in the ***chemical industry*** already during the socialist period. This remained unchanged after 1989, as skilled labour is required and relocation for this branch would prove very costly. In 2008, 23% of all enterprises in the chemical industry with more than 50 employees were located in Budapest. Győr, Tiszaújváros, Debrecen, Szeged and Székesfehérvár are also important centres for the production of chemicals (*Figure 133*).

The ***textile industry*** is losing its battle against inexpensive Chinese imports (or even cheaper products from Thailand and Vietnam), not to speak of the rising costs of employing a

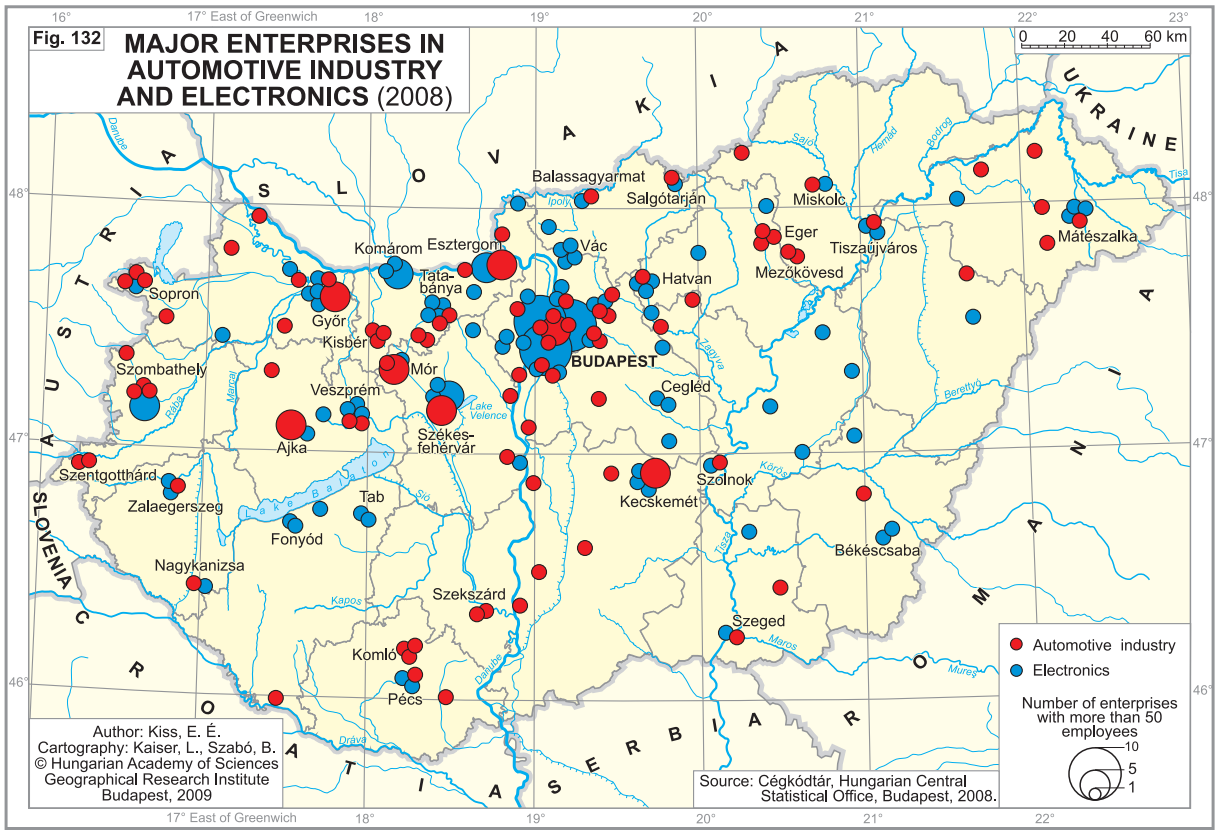


Fig. 132
MAJOR ENTERPRISES IN AUTOMOTIVE INDUSTRY AND ELECTRONICS (2008)
0 20 40 60 km
Balassagyarmat
Salgótarján
Miskolc
Eger
Tiszaújváros
Mátészalka
Komárom
Esztergom
Vác
Tata-bánya
Hatvan
Mezőkövesd
Sopron
Győr
Kisbér
BUDAPEST
Szombathely
Mór
Veszprém
Cegléd
Székes-fehérvár
Ajka
Szentgotthárd
Zalaegerszeg
Tab
Szolnok
Kecskemét
Fonyód
Békéscsaba
Nagykanizsa
Szekszárd
Szeged
Komló
Pécs
Automotive industry
Electronics
Number of enterprises with more than 50 employees
10
5
1
Author: Kiss, E. É.
Cartography: Kaiser, L., Szabó, B.
© Hungarian Academy of Sciences
Geographical Research Institute
Budapest, 2009
Source: Cégkódtár, Hungarian Central Statistical Office, Budapest, 2008.
17° East of Greenwich

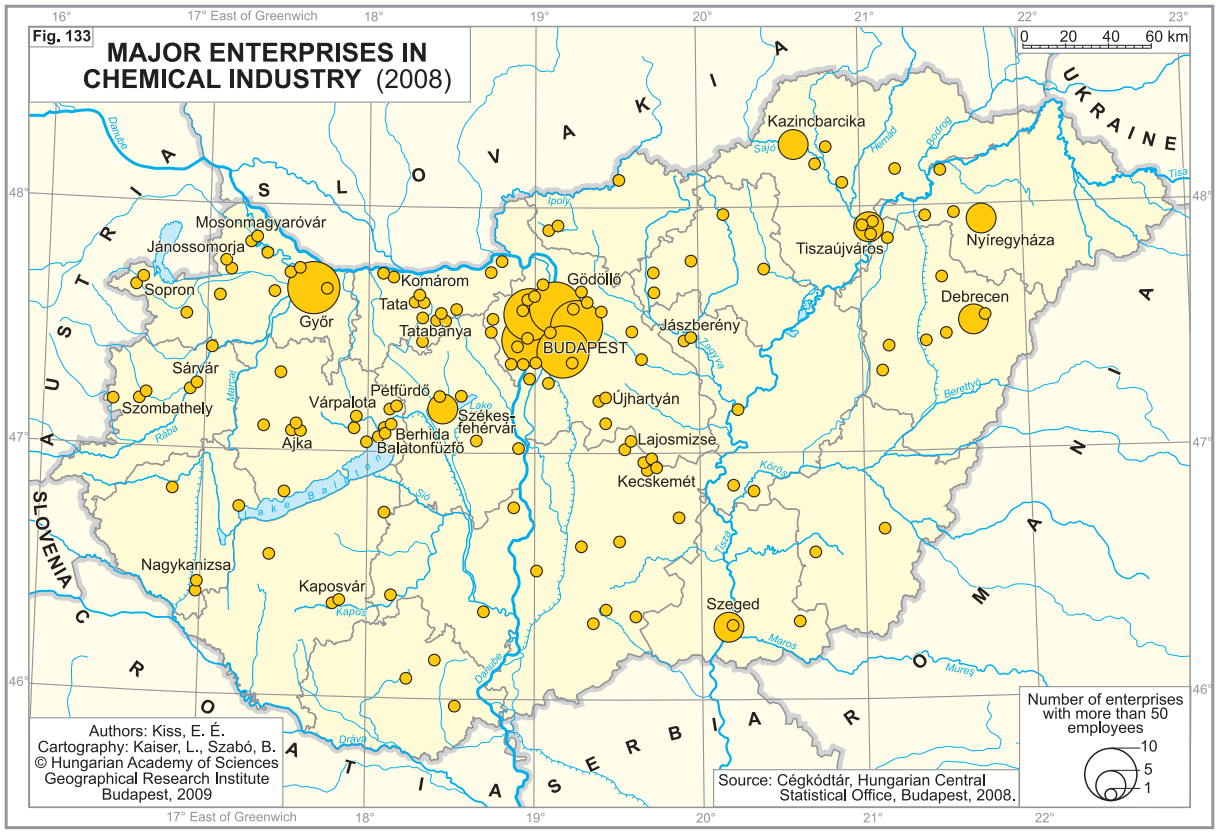


Fig. 133
MAJOR ENTERPRISES IN CHEMICAL INDUSTRY (2008)
0 20 40 60 km
Kazincbarcika
Tiszaújváros
Nyíregyháza
Mosonmagyaróvár
Jánossomorja
Komárom
Gödöllő
Tata
Sopron
Győr
Tatabánya
Jászberény
Debrecen
BUDAPEST
Sárvár
Szombathely
Pétfürdő
Várpalota
Újhartyán
Székes-fehérvár
Berhida
Ajka
Balatonfüzfő
Lajosmizse
Kecskemét
Nagykanizsa
Kaposvár
Szeged
Number of enterprises with more than 50 employees
10
5
1
Authors: Kiss, E. É.
Cartography: Kaiser, L., Szabó, B.
© Hungarian Academy of Sciences
Geographical Research Institute
Budapest, 2009
Source: Cégkódtár, Hungarian Central Statistical Office, Budapest, 2008.
17° East of Greenwich

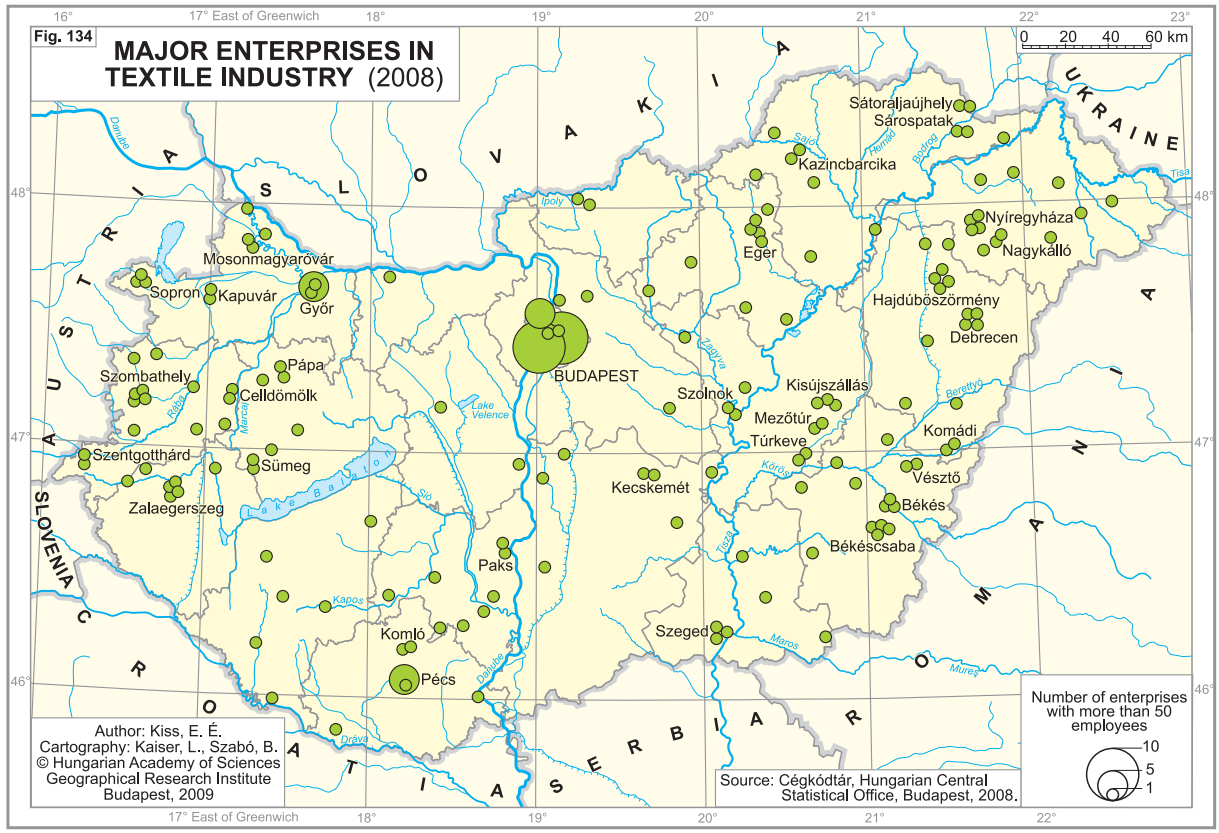
Hungarian labour force. This branch is struggling along in a permanent state of crisis. The majority of textile workshops with more than 50 employees are located in the countryside, where manpower is cheaper (*Figure 134*).

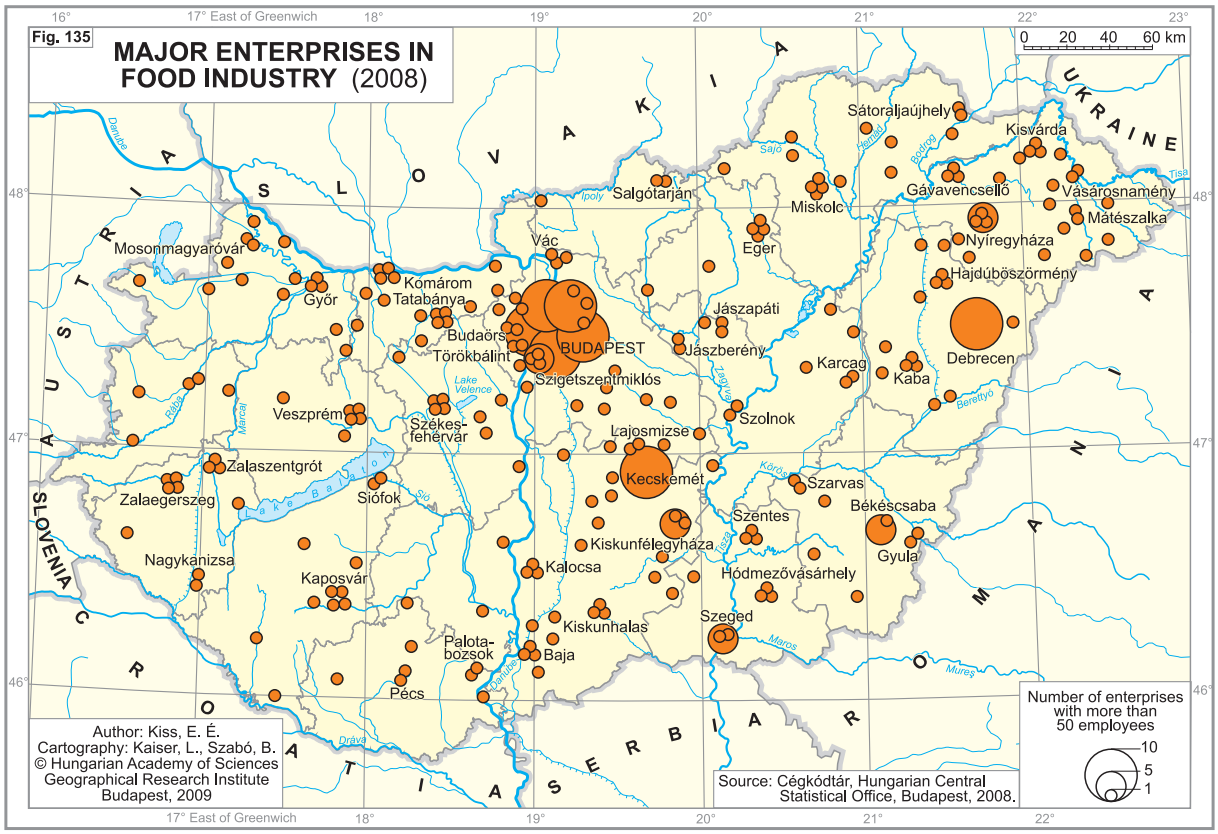
The domestic ***manufacture of footwear*** has also shrivelled, due to its cost base becoming uncompetitive, much the same as in developed western countries. Some of its remaining factories predominantly undertake subcontracted work for Austrian and German companies, and the bulk of shoes are exported.

The ***food industry*** which was once a relatively successful branch, is now facing serious problems as well. Since 1989 the production of meat, milk, sugar, etc. has declined considerably for various reasons, among which are changing consumer habits, decreasing demand, increasing costs, structural and ownership changes in agriculture, lower availability of domestic raw materials, and low procurement prices. It is for the same reasons that Hungary has become a net food importer by 2008. The spatial distribution of the food industry is mainly balanced, but spatial concentration can nevertheless be observed, even though this is to a different degree. For example, during the socialist era 12 factories operated in the sugar industry and now there is only one located in Kaposvár. Of the previously four large producers in the tobacco industry, only two have survived the changes post-1989. The food industry plays a significant role in employment and production, mainly on the Alföld (Great Hungarian Plain), where the bulk of its raw materials are produced (*Figure 135*).

In the 1990s, foreign investors in the machinery industry mainly founded assembly plants, which required a less qualified labour force. Lately, however, the magnitude of investment in R&D has increased. Several TNCs have established their research and development units (e.g. Nokia and GE), logistic bases or even regional headquarters in Hungary. The relocation of certain jobs abroad has structurally proven to be a positive change, as the relocations have mainly affected low-paid assembly workers. This has increased the pool of potential employees experienced in the machinery industries, able to undertake jobs requiring a higher degree of skill, in line with investment trends.

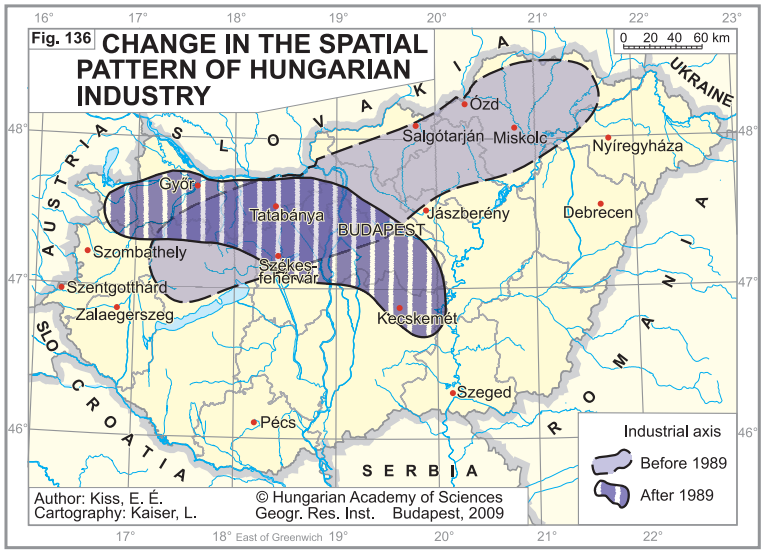
The structural transformation of industry has also resulted in a greater dependence on companies with foreign interest, and has increased the sector's exposure to global economic trends. The fate of each branch, especially in certain cases, is in the hands of larger parent





companies and activities frequently depend on decisions brought by foreign headquarters. As a whole, the structure of Hungarian industry has become less multilateral and more harmonised with global processes.

Spatial Pattern and Industrial Parks

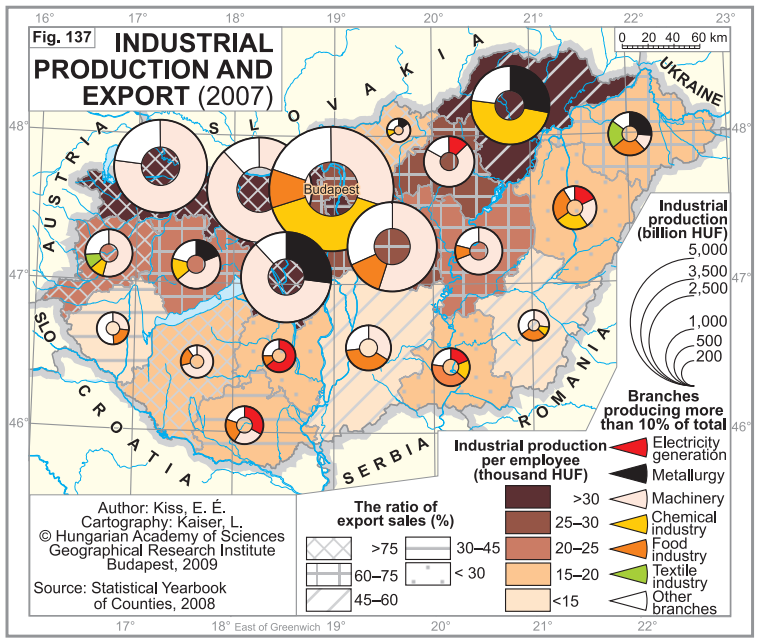


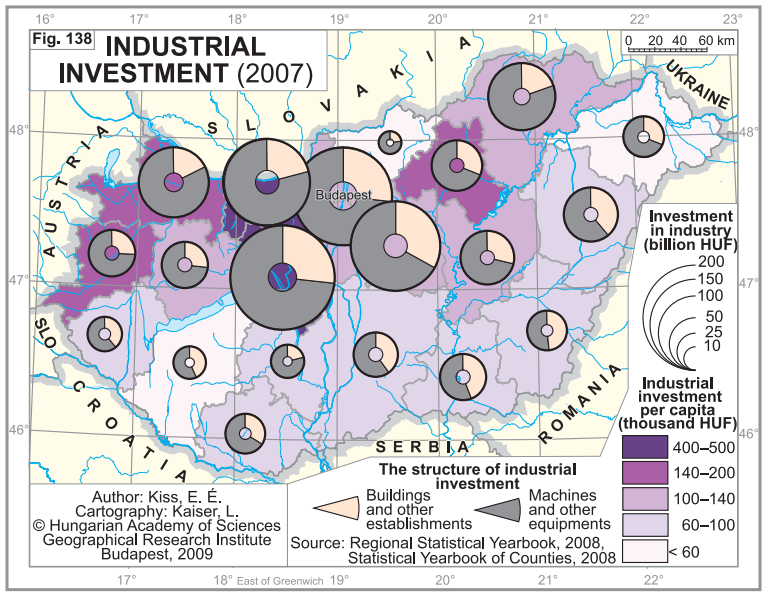
The new industrial – primarily foreign – enterprises, have greatly contributed to the transformation in the spatial pattern of industry. As the northern part of Transdanubia has become the major area of industrial production. Thus the former north-east–south-west industrial axis has been replaced by another one extending north-west–south-east (*Figure 136*). The region can be considered the 'winner' of the period since the change of regime. Besides the main new industrial areas, significant centres of manufacturing (e.g. Nyíregyháza and Jászberény) are notable only as 'islands'.

The traditional regions of ***heavy industry***, located in the mountains, suffered the heaviest toll after the regime change; they struggled with a serious crisis in the 1990s. Some of them (e.g. Tatabánya and Székesfehérvár) have managed to emerge, whilst others (e.g. Miskolc and Salgótarján) were very slow to recover. For example, Ózd can be still considered a 'ghost town'.

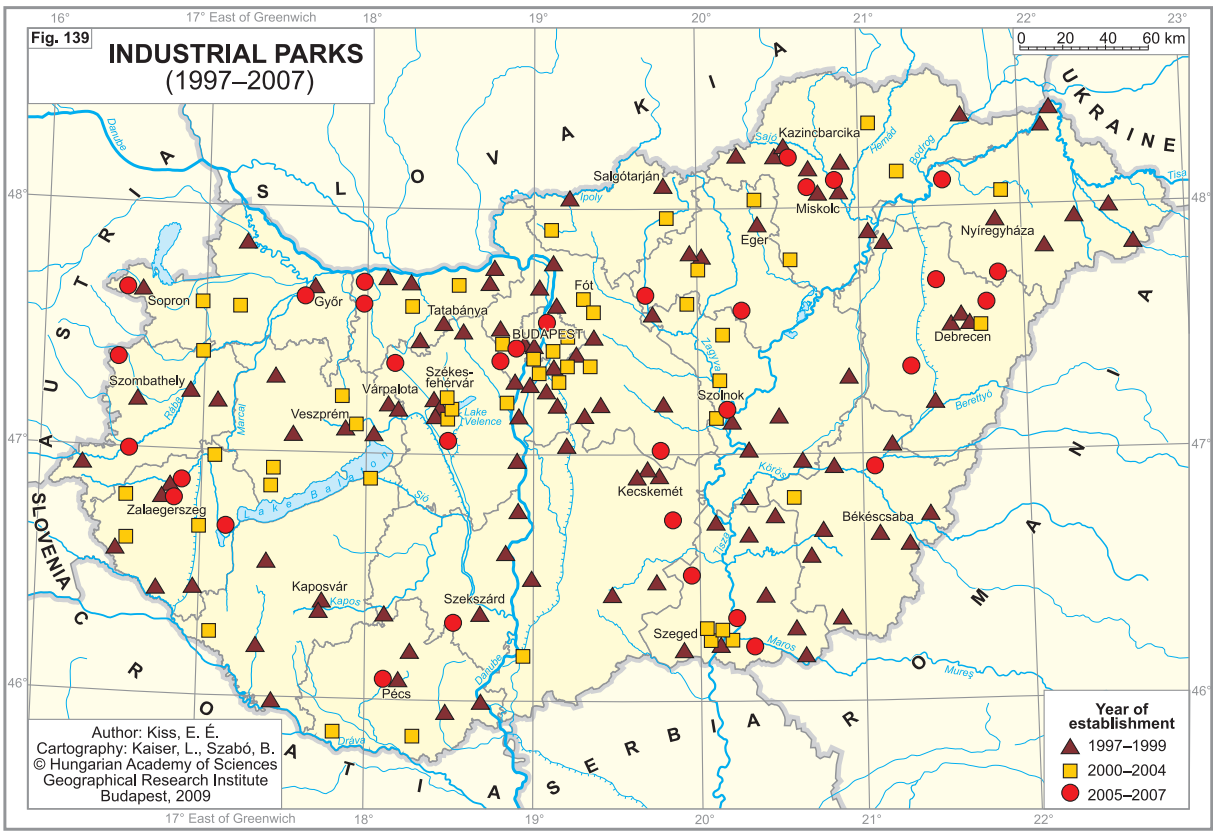
The situation of South Transdanubia and the Alföld is also unfavourable, owing to few industrial centres showing dynamism and swift adaptation to the new circumstances. The northern part of Transdanubia, together with Central Hungary has been the most important industrial areas of the country since the mid-1990s. In 2007, the value of industrial output per employee (HUF 28–67 million) and the share in exports (40–86%) were the highest in these regions. The firms located here manufacture goods primarily for the export markets and a significant quantity of their production is provided by the machinery industry (*Figure 137*).

During the last 20 years, the amount of ***industrial investment*** has continuously increased. The volume of this investment was again the highest in the new manufacturing regions. This is reflected in the amount of industrial investment per capita. In 2007, its value was the highest (HUF 461 thousands) in Fejér County, and the lowest in Nógrád County (HUF 45 thousands). At the beginning of the 1990s, the majority of investment was dedicated to the construction of new industrial facilities or for refurbishing the old ones. However, from the end of the decade, generally 60–80% of investment was spent on the purchase of machinery and other equipment (*Figure 138*).





Many ***industrial parks*** can be found in the new industrial region. They are mostly the oldest and most developed, and concentrate lots of enterprises with foreign interests. By 2008, 198 industrial parks had been established in Hungary. Generally, they are an urban phenomenon; less than one tenth of them are to be found in villages (*Figure 139*). Industrial parks are very important for many reasons and not only on a regional level, but also for the local economy. In 2006, almost 3,200 industrial enterprises were located on industrial parks, where 23% of all industrial employees or 186 thousand persons worked. Their total area extended to 10 thousand hectares, 53% of which was occupied. This relatively limited occupancy rate can be explained by the oversupply of industrial parks, providing potential investors a wide of array of choice when decide where to locate. Industrial parks offer a good base for the establishment of clusters, but as of today the visibility of clusters in manufacturing is



yet not significant. Most (64%) of manufacturing clusters are concentrated in the northern part of Transdanubia.

The magnitude of vertical and horizontal connections between companies belonging to the same, or different branch, can play an important role in shaping the industrial space in the future. However, the global economic crisis that emerged in the second half of 2008 may affect Hungarian industry very sensitively. Branches that are particularly affected by the crisis may have a strongly modifying impact upon the structure of, and spatial patterns visible in domestic industry. For this reason, a new era may be dawning on Hungarian industry.

Transport

Central Location and Monocentric Network Structure

Hungary is one of the hubs of international transport in the eastern half of Europe, linking the macroregions of the continent, whilst at the same time providing connections between the peripheries of the Carpathian Basin. Hungary is one among the European countries with a highly monocentric transport network. The Budapest-centered railway network was built in the 19th century, in the era of the Austro-Hungarian Monarchy with the aim of developing Budapest into a fitting counterpart for Vienna. The transversal railway lines built prior to World War I were cut off by the redrawn borders of the Treaty of Trianon, making the remaining transport network completely monocentric. This feature was further enhanced by the construction of a network of main roads similarly centered on Budapest. Attempts to ease the effects of this unfavourable spatial structure (plans for transversal lines to establish direct connections between eastern and western parts of the country) have failed, and no significant changes have occurred for decades. Thus 85–90% of the east–west long distance, i.e. international traffic, still flows across the agglomeration of the capital. The monocentric structure of the transport network is further accentuated by the EU's trans-European corridors, alongside with the newly built highways which form part of the corridors.

The Sub-Structure and Transport Policy

Modal split has advanced rapidly since the change of regime and especially since the country's accession to the EU. Although international transport policy concepts have stressed the increasing importance of environmentally friendly railway and waterway transport, and of the reduction of road traffic, projects aimed at network improvements have focused on road (and partly airport) construction, neglecting the development of railway and waterway transport.

The rapid increase in road transport can be traced back to the changes in freight transport, and to the boom in the spatial mobility of the population. Following the decline of branches of the economy that relied on transport, the total weight of transported bulk commodities has decreased considerably, whilst road transport capacity for smaller loads almost tripled from the 1990s to 2007. Overcrowding and traffic jams on the roads have become rather frequent phenomena, contributed to by the growing number of trucks and vans of forwarding companies, serving as the rivals of rail transport.

Transport Networks and Vehicle Supply

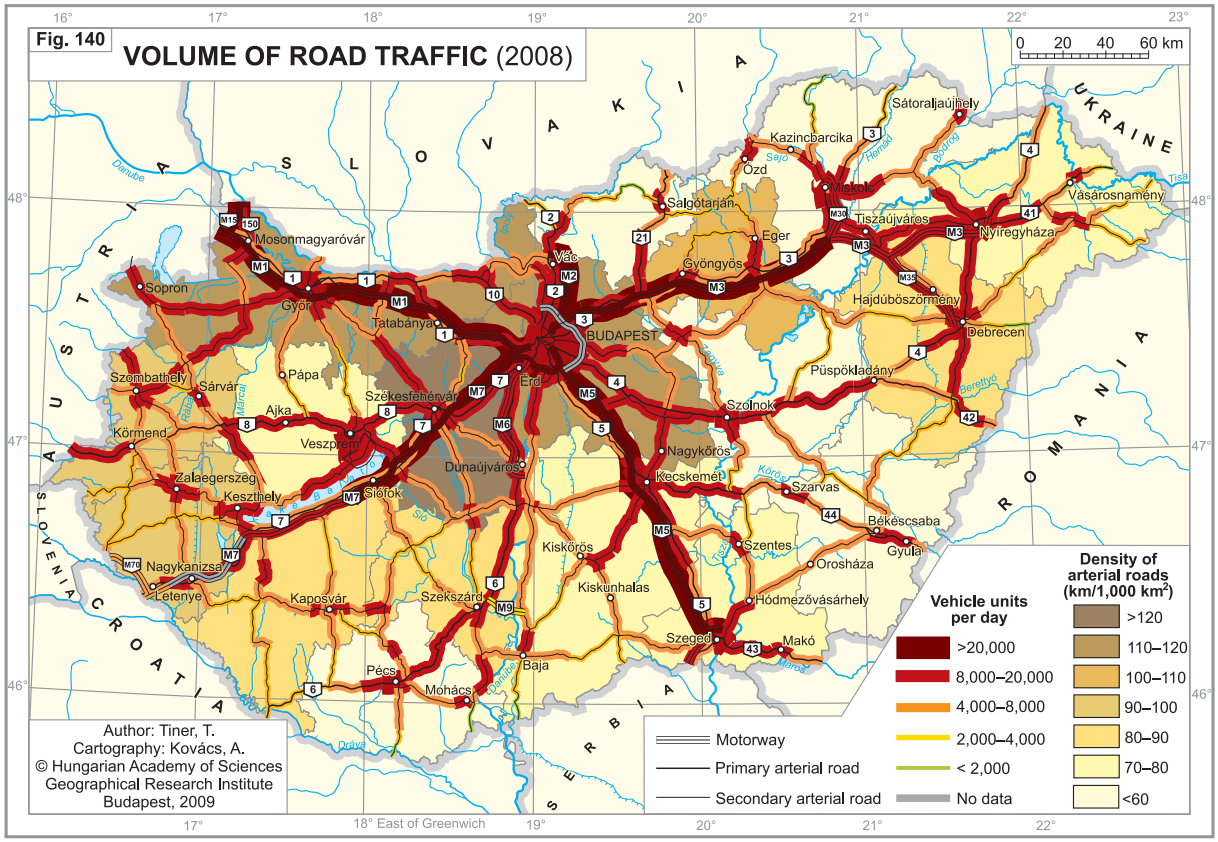
The length of the complete ***road network*** of Hungary (163.4 thousand km) exceeds 19.5 times that of the railway network. However, only 31.2 thousand km of this is part of the

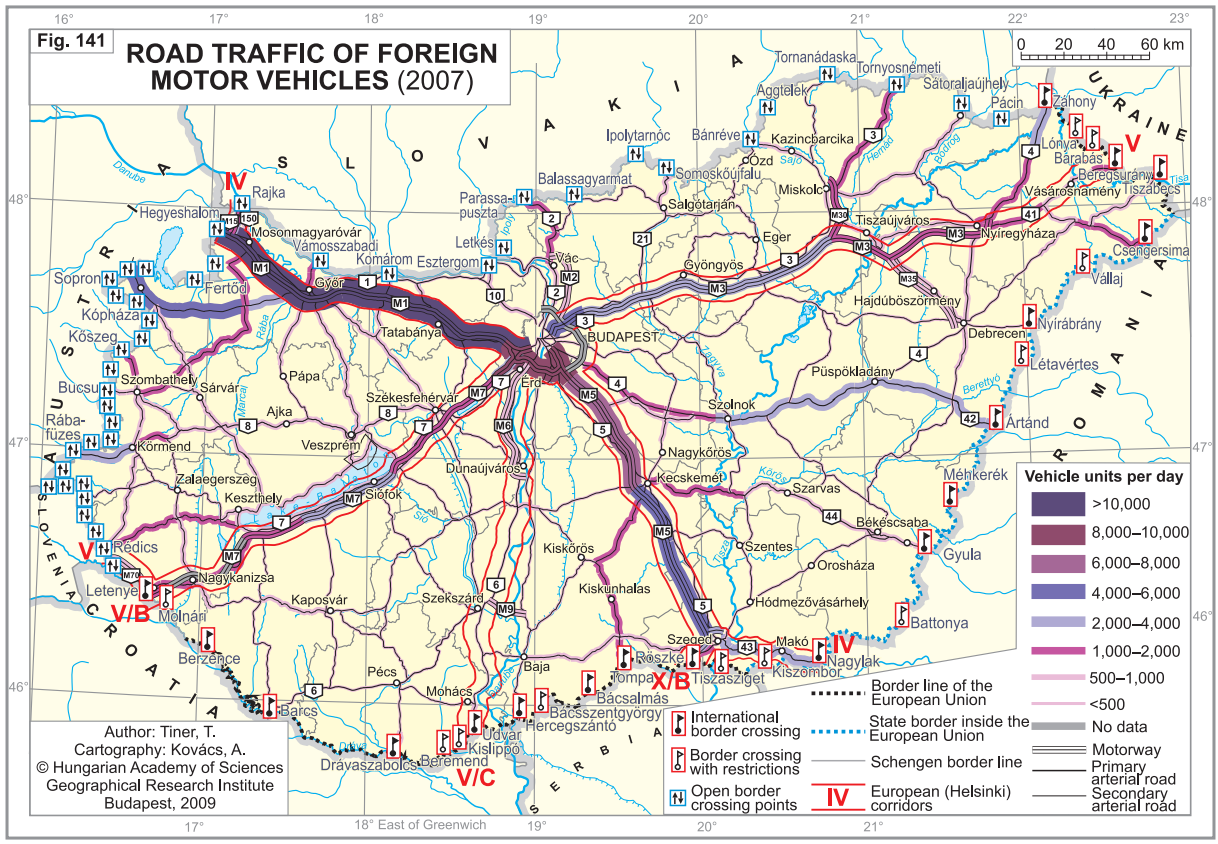
national public road network, which is hierarchically subdivided. The total extension of the country's motorways and primary arterial roads amounts to 1,100 km, being one of the longest among the former socialist countries (second only to Croatia). In road density (335 km/1,000 km^2) Hungary is overtaken only by Croatia and Slovenia. With the exception of the M0 which is an orbital relief road circumventing the capital, the highway network has a radial pattern. The M1 connects the country with Austria (and western Europe), M2 and M15 with West and Central Slovakia, M3 with Ukraine, M5 with Serbia and Romania, and the M7 with Croatia. Further, the M70 feeds into Slovenia and the M6 (after its full completion) will provide link towards Croatia and Bosnia-Herzegovina. The M30 provides access to eastern Slovakia from the direction of Miskolc, while the M35 to Romania from Debrecen. These main roads carry 60–65% of national road transport and about 80–85% of international traffic (*figures 140 and 141*).

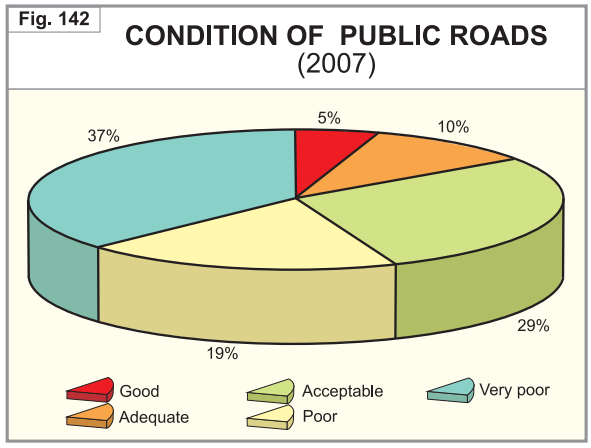
In Hungary, the proportion of arterial roads and motorways is 25.8%, which correlates to the European average. Their density on the country's peripheries is significantly lower, whilst in the wider area of the capital it is higher, which is also visible in the various densities of county roads (*Figure 140*). Main roads and motorways form international road corridors (Helsinki corridors). Several radial arterial roads starting from Budapest and some cross-directional main roads are parts of the transcontinental public road network (E-roads).

In many places, the situation of country roads as main thoroughfares (total length of 1,500 km) has became critical, both from the viewpoint of traffic and from environmental protection. The development of bypasses is progressing rather slowly, compared to their pressing need. One fifth of side roads are access roads leading to settlements (mainly to small villages), while the remaining four fifths are connecting roads between settlements. The ratio of access roads in certain counties (e.g. Nógrád and Baranya) is 35–40%.

98.6% of the public road network is paved, 95% of which is asphalt-covered. The condition of the surface can be rather poor, and sections in a very bad shape are frequent occurrences (*Figure 142*). Improving main roads so that they comply with the EU-norm for 11.5 ton axle weight vehicles seems to be an insoluble task, even following several years of deadline



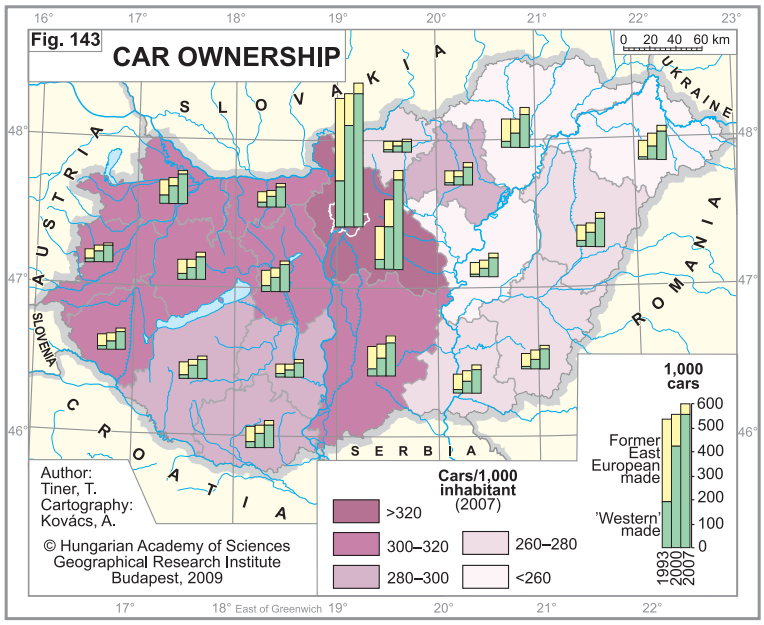




extentions provided by the EU. Only 34% of local public roads (with a length of 105.2 thousand km, more than triple that of the national network) owned by the local governments, are paved.

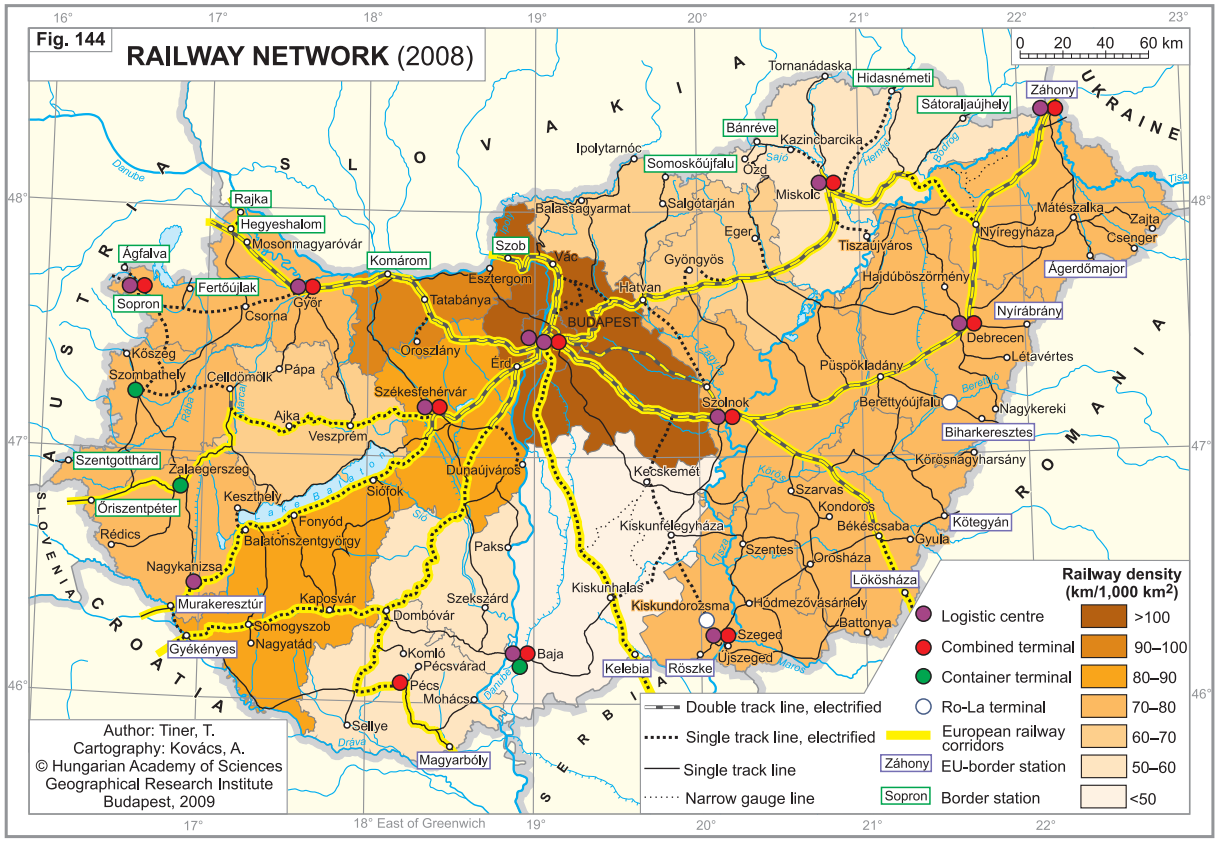
Although large scale motorisation in Hungary started in the 1960s (mainly reliant on imported vehicles), only the abolition of restrictions on buying cars, along with increasing purchasing power has led to the widespread popularity of private transport. The former dominance of cars made in the Eastern Bloc has vanished since the regime change, due to the arrival of domestic vehicle production plants and the liberalisation of import. The sudden satisfaction of formerly repressed demand has led to the virtual doubling of the number of registered cars since the 1990s. On the basis of the specific indicator of passenger car ownership (301 cars per 1,000 inhabitants), Hungary is the fourth highest in Eastern Europe. The degree of ownership effectively reflects the regional disparities in incomes of the population, so significant spatial differences can be observed. The maximum difference between the counties is 1.5 times, while among the towns there is a 3.7-fold, and among the villages there is a 13-fold variation. In the 1970s and 80s, mining settlements and heavy industrial towns had the highest figures. In 1993, the majority of private cars on the Hungarian roads were made in the Eastern Bloc, whilst today, Western and Asian passenger cars are the most widespread. The proportion of Western made cars is a characteristic feature of Budapest, whereas a relatively high proportion of cars of Eastern Bloc origin is typical of the Alföld. (*Figure 143*)

The ***railway network*** of Hungary (*Figure 144*) was 10,290 km long at the end of the 1950s. Later the total length of the network was short-



ened by 1,500 km, first by closing short railway lines (which were reduced to branch lines in function after Trianon truncated them with the new borders), then in the 1970s by closing dozens of lines connecting main railway lines, and by ceasing the use of narrow gauge services. This can be viewed in the context of other former-socialist countries where there were no significant reductions in railway lines, except for Yugoslavia and Romania. Since the 1980s, only a few lines have been closed, but passenger transport has ceased over another few hundred kilometres. According to future plans, the network of branch lines that carry low passenger volumes and of selected main lines will be shortened by 2,500–3,000 km. Today the Hungarian railway network is one of the densest in the eastern half of Europe (82 km per 1,000 km^2). It reaches its maximum density in the wider agglomeration zone of Budapest and in the eastern part of North Transdanubia, and drops to its least along the peripheries (southern part of the Danube–Tisza Interfluve, eastern portions of South Transdanubia and North Hungary).

26.1% of the country's 7,635 km of standard gauge railway line is double tracked (2007), and 35.5% of it is electrified. In this respect Hungary is lagging far behind several 'eastern' European states (such as Russia, Bulgaria, and Poland). The main lines of the railway network

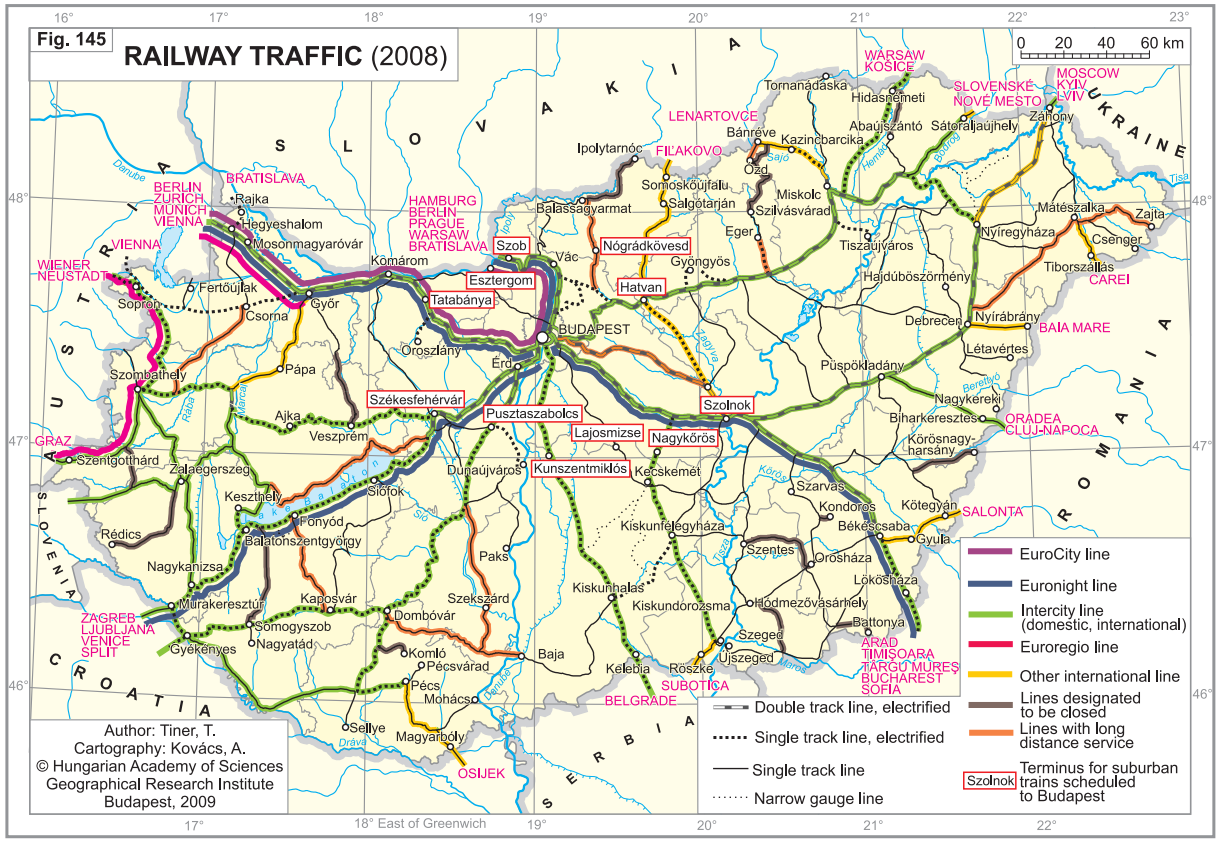


are constituents of the European corridors; the majority of logistic centres, combined and container terminals, and RoLa terminals are located alongside them. Rebuilding the international main lines so that they are suitable for speeds of 120–160 km/h and the installation of modern signalling systems are under way with EU assistance. However, on 60–70% of the branch lines, passenger trains can only travel at 20–35 km/h because of the obsolete technology.

Since 1993, most of the network has been operated by the state-owned service provider, Magyar Államvasutak Zrt. (MÁV, Hungarian State Railways Co.). Railway infrastructure is maintained by the state-owned MÁV Pályavasút [MÁV Railway Infrastructure Services Co.] and is used by MÁV START Vasúti Személyszállító Zrt. (MÁV START Railway Passenger Transport Co.) engaged in the carriage of passengers, and the Austrian owned MÁV Cargo, exchange for fees. GYSEV, the well-established Hungarian-Austrian company has its own separate standard-gauge railway in West Transdanubia.

Only a small proportion of the railway fleet is Hungarian made; following the decline of the – once famous – domestic locomotive and rolling stock industry, MÁV now mainly operates foreign made locomotives and rolling stock. The fleet is rather elderly and because of the modest activity in the procurement of replacements, it is growing ever older. The majority of modern passenger coaches travel on international and national main lines (IC, EC, EN and Euroregio services) or serve as commuter trains in the Budapest agglomeration (powered railcars) (*Figure 145*). The fact that the railway fleet does not meet either the needs of traffic or environmental requirements, is a serious problem. There are large numbers of inefficient diesel locomotives and unused rolling stock, and the availability of railcars for low volume branch lines is meagre.

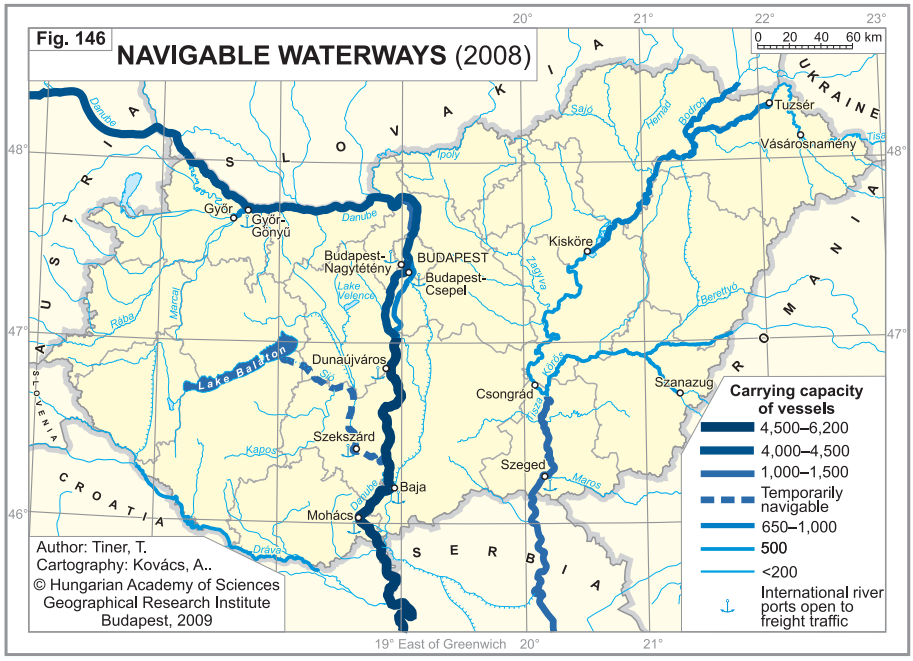
The length of II–IV B category ***waterways***, with year-round navigability is 1,373 km, and temporarily navigable waterways add an extra 249 km. This network slightly exceeds the European average. The condition of inland waterways is below par and poses an obstacle for EU shipping (the transit of 1,350–1,500 ton vessels). With respect to nature conservation and environmental protection issues, Hungary has abandoned the idea of constructing further dams, and dredging provides a satisfactory tool for deepening riverbeds. Even at the beginning of the 20th century, the Tisza and Dráva rivers experienced

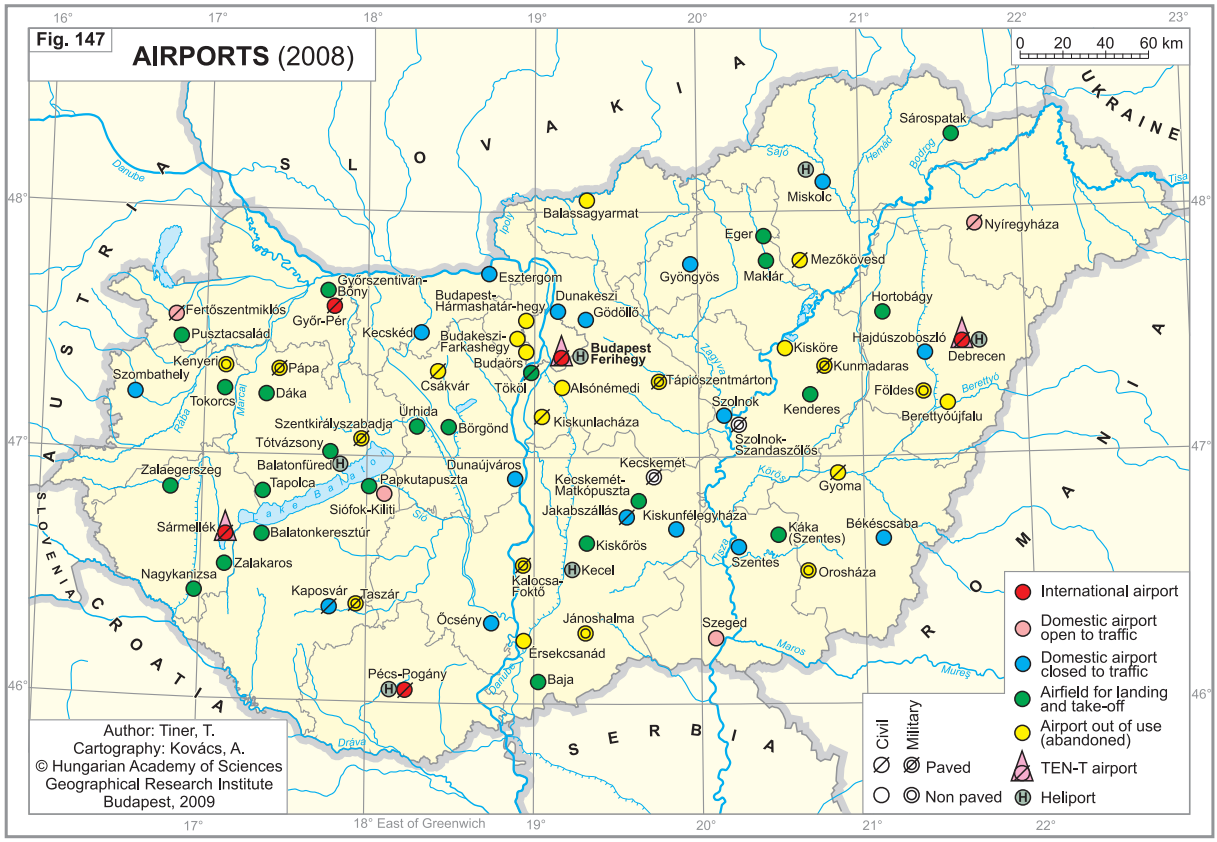


dynamic traffic levels of small vessels; today the Danube is the only river to be regarded as an international waterway (Helsinki corridor VII) suitable for the transit of economic size vessels. With favourable water levels it is navigable by both river and sea vessels (*Figure 146*).

Today, Hungary's merchant fleet has only a fraction of the vessels it used to possess in the 1950. There is a great lack of modern, self-propelled barges that are suitable for reaching the Rhine through the Danube-Main canal. Most of the fleet in operation is outdated.

Turning to ***air transport***, with regards to the ground infrastructure of civilian airports, Budapest Ferihegy stands out, with its three passenger terminals. The civilian airports of Sármellék (Balaton Airport) in Transdanubia and that of Debrecen in the Tiszántúl region, were founded by converting former military airfields, in order to make them suitable for civil aviation. Because of the shortness of their concrete runways, Pécs and Győr airports





are suitable only for operating low volume passenger flights. The operators of the larger airports are foreign (German, Irish and British) companies. Most of the airfields in the country are grass-covered, thus can only be used for lightweight civil aircraft and agricultural crop-spraying purposes. Only a handful of the former military airports were involved in civilian air traffic, so there are only three TEN-T airports from which scheduled flights can depart (*Figure 147*). Hungarian civil passenger aviation is represented by the Russian-owned national flag-carrier, MALÉV. Elderly Soviet-made airliners have been replaced with aircraft manufactured by Boeing and Bombardier.

Traffic

Since the 1980s, the most serious decline has been taken place in the volume of ***rail freight***. There was a slightly smaller decline in ***passenger traffic*** carried by the railways, due to the decrease in the number of commuters which was partly compensated by an increase in leisure and shopping travellers (*tables 36 through 38*). Within the framework of the decreasing domestic part of freight tonnage carried by railways, the share of international freight transport has shown a tendency to grow (87.3% in 2007), as did the average length of journeys (188 km, while for road transport it was 147 km and for water transport it was 263 km). ***Water-based transport*** is modest and stagnating. Of its freight-ton km, transit makes up 65% of volumes, Hungarian exports account for 25%, imports for 9%, and domestic transport is only 1%.

Since the change of regime, the changes in spatial diversification and direction have had dual-effects: in a larger scale it now concentrates on international corridors (because of the increasingly road-oriented national and transit traffic), and also focuses on the connections with western Europe.

Road traffic can be summarised by distinct flows along a north-west–south-east axis,

Table 36. ***Volume of freight traffic (1980–2008)***

Year	10,000 tons	Index (1980 = 100%)	Freight ton kms, million	Index (1980 = 100%)
1980	381,651	100.0	41,870	100.0
1990	230,112	60.3	42,072	100.5
1994	112,303	29.4	15,249	36.4
2000	215,946	56.5	26,398	63.0
2008	343,954	90.1	53,522	127.8

Source: Hungarian Central Statistical Office (www.ksh.hu)

Table 37. ***Volume of passenger traffic (1980–2008)***

Year	Interurban passenger transport				Urban passenger transport			
	Number, million	Index (1980 = 100%)	Passenger kms, million	Index (1980 = 100%)	Number, million	Index (1980 = 100%)	Passenger kms, million	Index (1980 = 100%)
1980	1,001.1	100.0	28,419.6	100.0	2,893.1	100.0	13,733.1	100.0
1990	765.5	76.5	23,783.5	83.7	3,143.8	108.7	12,573.5	91.6
1994	647.5	64.7	19,429.0	68.4	2,653.6	93.2	10,410.9	78.3
2000	735.1	73.5	25,393.0	89.4	2,468.6	85.3	9,757.0	71.0
2008	691.1	69.0	25,989.0	91.4	2,123.8	73.4	8,587.0	62.5

Source: Hungarian Central Statistical Office (www.ksh.hu)

Table 38. ***Modal split in freight traffic by transport type (1990–2008)***

Type of transport	By weight of transported goods				By freight ton kms			
	1990	1994	2000	2008	1990	1994	2000	2008
Railway	43.4	43.0	23.2	15.0	40.9	50.5	30.6	18.4
Road	45.3	36.4	65.9	75.1	11.9	17.3	50.5	66.8
Waterway	1.6	1.5	1.1	2.6	35.9	5.2	3.4	4.2
Air	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.1
Pipeline	9.7	19.1	9.8	7.3	11.3	26.9	15.2	10.5
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Hungarian Central Statistical Office (www.ksh.hu)

as well along a north-east–south-west corridor, with a fairly high proportion being transit traffic. In addition, there are flows from the north-eastern part of the country and in Transdanubia, in a north–south direction.

Due to the continuous decline in the railways, ***passenger transport*** is now focused on two types of service: the daily commuter services operating in the Budapest agglomeration zone (with a radius of 50–70 km from the city centre) and the scheduled IC (Intercity) train services. Due to the latter type of service, the average distances travelled have increased since 1990, yet international volumes have declined to one quarter as a result of cheaper bus fares, low-cost airlines and the increase in passenger car traffic.

Of the high quality railway services, EC (Eurocity) connects Budapest only with cities in the western part of Europe, EN (Euronight) travels to the West Balkans, Italy and Romania, while international ICs go to and from Austria, Slovakia, Ukraine, Romania, and Serbia. Euroregio trains only serve Austria, while the destinations of inland IC trains which depart from Budapest are Hungarian county seats (*Figure 145*).

The corridor from West Europe to Budapest, via Vienna in Austria, is the most intensely used by all means of transport. In ***international air traffic***, most planes fly through these corridors as well – departing in the direction of Vienna – towards West Europe. From Budapest, flights depart to 75 destinations, out of which connections are the most frequent with London, Paris, Frankfurt and Rome, partly served by low-cost carriers (*Figure 148*). The number of flights to other parts of the world are limited, although of note is the direct connection between Budapest and New York, Fort Lauderdale and Beijing.

Telecommunications

Wired Telephony

Until the 1990s, the development of telecommunications in Hungary had fallen behind the level of development witnessed elsewhere in the national economy, and failed to meet public demand. Even in the year of the regime change (1989), the total number of telephone subscribers was below 1,000,000 persons (88 phones per 1,000 inhabitants), a mere 18% of local main exchanges were automated and only 540 settlements were connected into the automated long-distance dialling network. These statistics were symptomatic of a system lagging far behind the contemporary European average. For decades the only operator of the national wired public telephone network was the Hungarian Post Office, in a monopoly status that was maintained until 1989.

Parallel with the developments in Hungarian politics during the time of regime change, a new era was dawning in Hungarian telephony. With the establishment of ***MATÁV*** Hungarian Telecommunications Company Ltd. – as one of the successors of the former state-owned Hungarian Post Office, which was split into three subsidiaries in 1989 – a massive program of network development was launched in 1990. The majority of the financial resources (more than USD 400 million), was derived from the privatisation of MATÁV, following the new Telecommunications Act of 1993 that opened the legal route to acquire national concession rights; Deutsche Telekom and Ameritech International became MATÁV shareholders. These two companies had captured 30% ownership of the national concession that had been mandatorily transferred to MATÁV at the end of 1993.

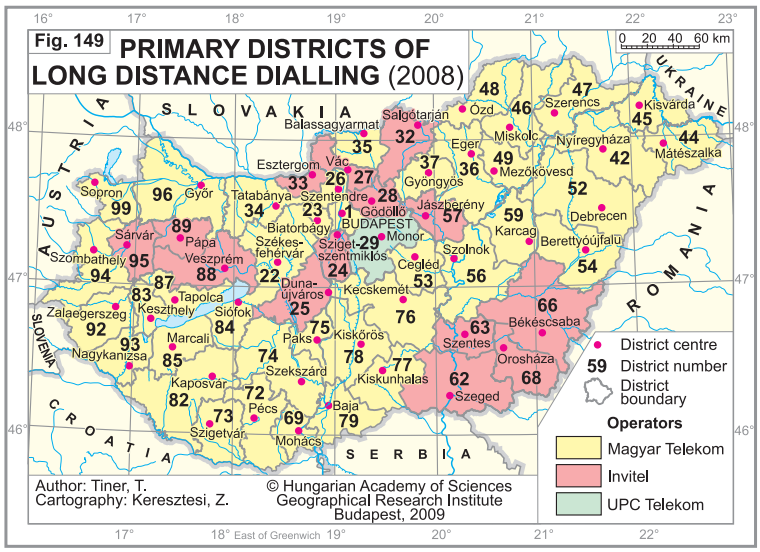
In February 1994, following the announcement of the regional concession tender results, 12 local telephone operators (LTOs) were established (e.g. Déltáv, Emitel, PanTel, Monortel, Jásztel and Hungarotel). MATÁV's coverage area included about 70% of the territory of Hungary and 72% of the population, including 36 primary districts where local telephone services were provided by the company (the remaining 15 districts being distributed among the 12 new LTOs). In 1995 the MATÁV shareholding of the two investors increased to 67% (USD 852 million). On the basis of the combined value of the two share tender offers, MATÁV's privatisation was one of the largest transactions of its kind in the Central and East European region and represented the largest foreign direct investment (FDI) in Hungary.

As a result of these investments, the length of fibre-optic networks of MATÁV and the LTOs was enlarged by more than 10,000 km, the capacity of digital exchanges increased 260-fold, and the number of residential lines grew by 380% during 10 years.

In 2000 Deutsche Telekom acquired majority ownership (nearly 60%) of MATÁV. The following year the Hungarian company became an international telecommunications group, when a consortium led by MATÁV acquired a majority stake in Macedonia's national telecommunications company Makedonski Telekomunikacii (MakTel), hence MakTel became a consolidated subsidiary of the Group. Then in July 2001, Emitel became a fully-owned, consolidated MATÁV subsidiary that provided residential and business telecommunications services in the Southern Alföld region.

2001 was the year when the Hungarian telecommunications market was fully liberalised. The field of fixed-line telephony was the last segment of telecommunications where the market was opened. The group's companies achieved leading positions in mobile telephony, internet and business data communication markets and obtained over 80% market share of the fixed-line telephone market.

In December 2003 MATÁV announced the connection of the 100,000th ADSL line. In the same year the number of towns where this service was available tripled to reach 128. Since 1 January 2004 – when the Electronic Communications Act entered into force, that



In December 2004 MATÁV acquired a 73% majority stake in Telekom Montenegro, and has become a strategic investor in the South-East European region. In May 2005 the MATÁV Group was renamed ***Magyar Telekom Group***, consisting of T-Com, T-Online, T-Mobile, T-Systems and T-Kábel subsidiaries, jointly offering a full palette of telecommunications services for residential and business customers.

In 2007 several LTOs (e.g. Hungarotel, Pantel, V-holding, Euroweb, etc.) merged to form the Invitel Telecommunications Company, the second largest service provider in the fixed-line telecommunications market. Since then, Magyar Telekom has been in sharp and permanent competition with Invitel. The concessionary service area of the latter comprises 14 primary districts of the country, covering nearly 17% of Hungary's population.

In 2008 Magyar Telekom became the principal provider of telecommunication services in Hungary and operated local telephone services and long distance dialling in 38 primary districts *(Figure 149)*. Its latest technical innovations have seen it install, in 2009, a 2,700 km-long optical NG-WDM (Next Generation Wavelength Division Multiplexing) backbone network. Magyar Telekom now offers its customers superfast wired broadband access, which is much faster than ever before. The relative commercial values of supplying fixed-line telephony to households and the volume of initiated calls are steadily diminishing since 2000, owing to the rapid spread of mobiles all over the country *(Table 39)*. Meanwhile considerable regional differences exist in this field of telephony *(Figure 150)*.

Table 39. ***Relevant telecommunications data (1990–2008)***

Year	Number for			
	Wired telephone lines, 1,000	Calls initiated from wired network, million	Mobile phone subscribers, 1,000	Calls initiated from mobile network, million
1990	996	1,301	..	..
1991	1,129	1,456	5	3
1995	2,157	2,922	267	294
2000	3,801	4,191	3,076	2,258
2005	3,453	2,999	9,320	5,995
2008	3,103	1,981	12,224	7,778

.. no data
Source: Hungarian Central Statistical Office (www.ksh.hu)

Table 40. ***Telecommunications data for Central and South-East Europe (2008)***

Country	Number of			Broadband penetration rate, %
	Wired telephone lines	Mobile telephone subscribers	Internet users	
	per 1,000 inhabitants			
Austria	408	1,186	671	19.2
Bulgaria	301	1,296	311	7.6
Croatia	405	1,105	436	..
Czech Republic	236	1,249	488	14.6
Hungary	**324**	**1,101**	**524**	**14.2**
Poland	271	1,087	442	8.4
Romania	199	1,067	241	9.7
Slovakia	214	1,126	559	8.8
Slovenia	428	964	530	9.1
EU 27 (average)	476	1,155	574	20.1

.. no data
Source: Hungarian Central Statistical Office (www.ksh.hu)

contained EU-compatible market regulatory provisions – fixed-line number portability became a reality in Hungary.

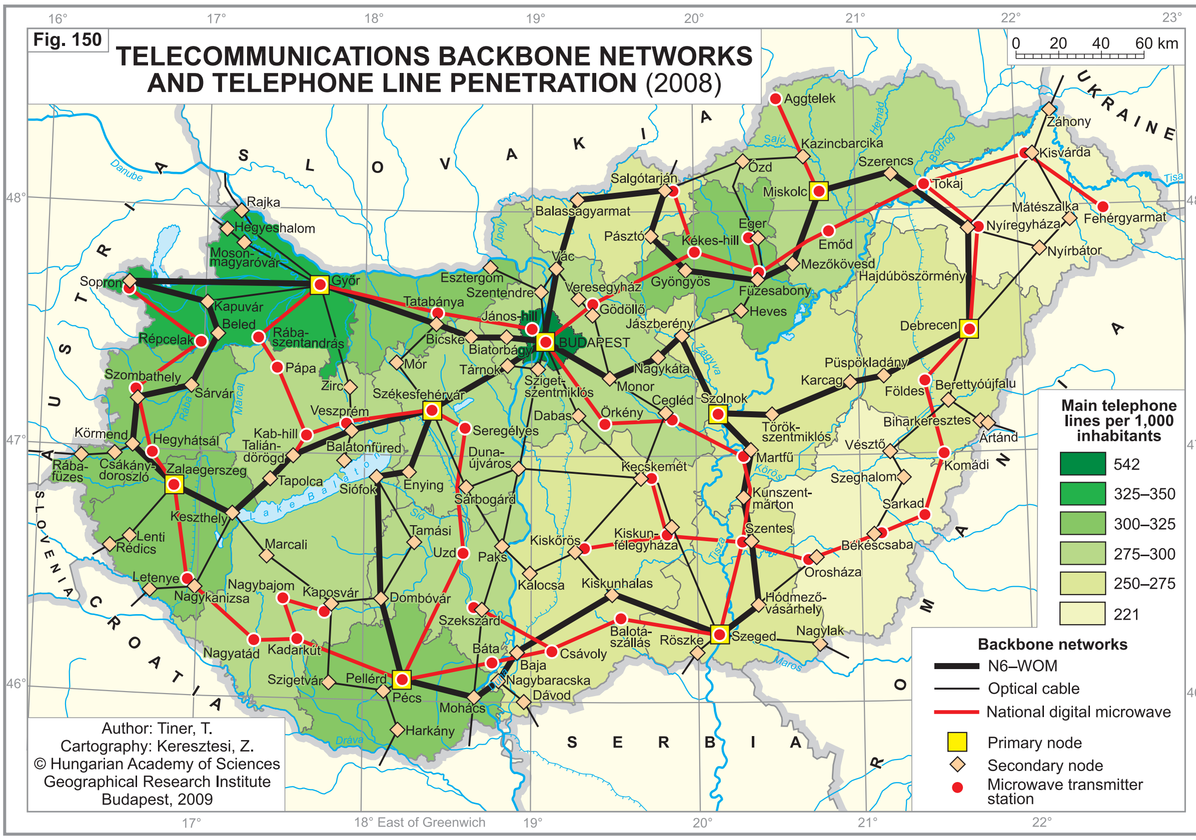


Fig. 150 TELECOMMUNICATIONS BACKBONE NETWORKS AND TELEPHONE LINE PENETRATION (2008)

By the end 2013, Magyar Telekom plans to offer approximately 780,000 households a fibre-to-the-home (FTTH) network, and to further upgrade 380,000 households to whom a hybrid-fibre-coaxial network is currently available.

When comparing the main telecommunication parameters of Hungary with the same values of other Central and South-East European countries, considerable differences can be observed that of EU 27 average *(Table 40)*.

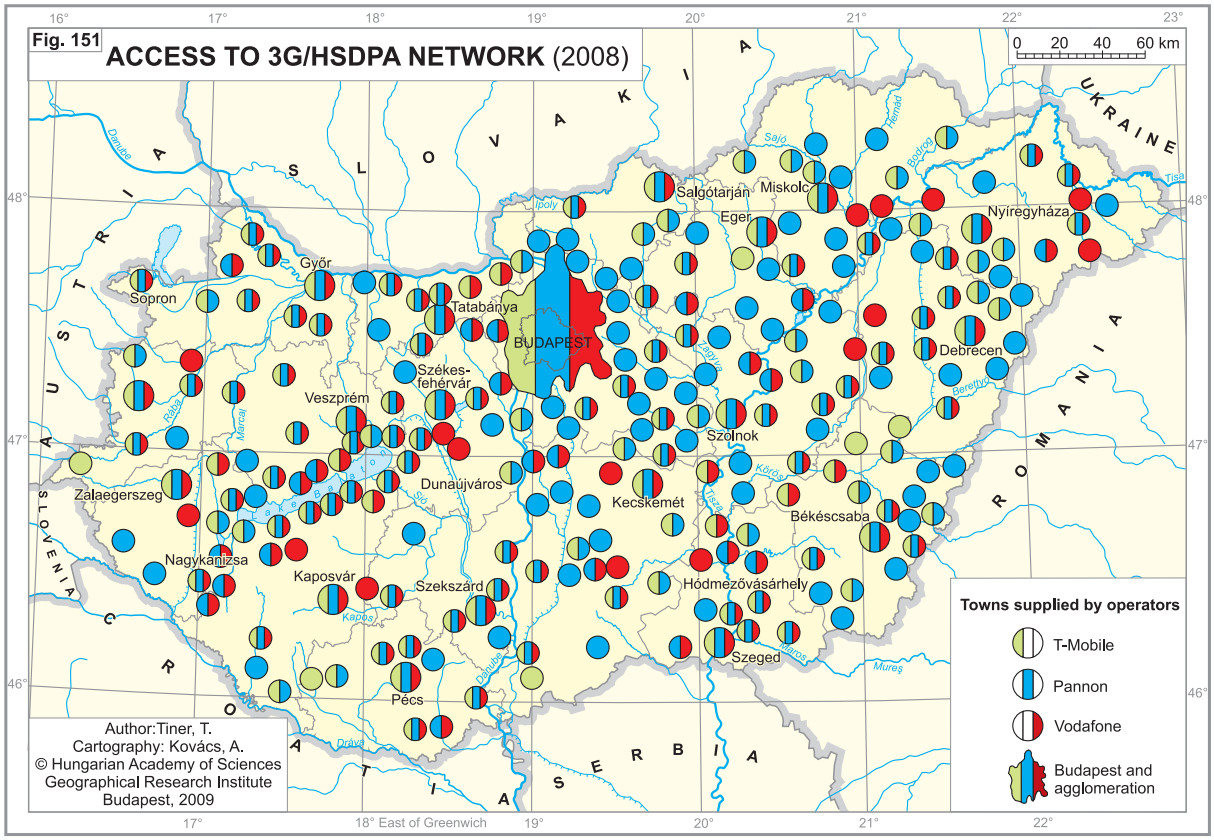
Mobile Telephony

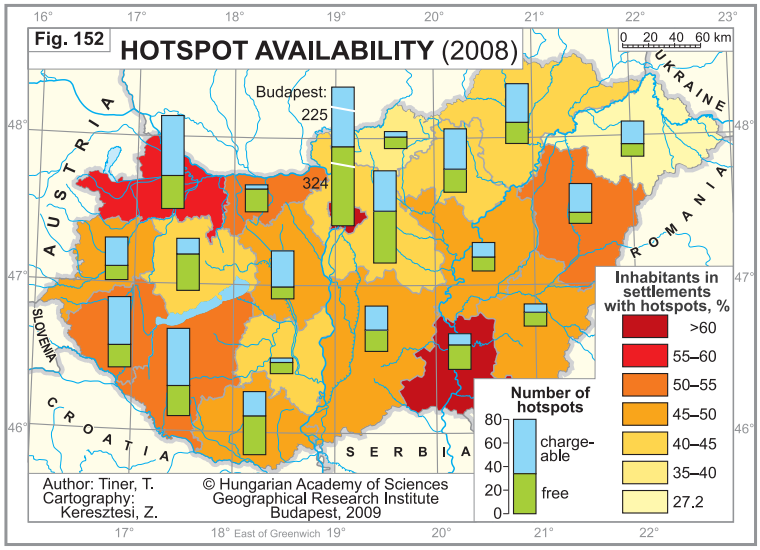
In Hungary there are three mobile telephony providers: ***T-Mobile Hungary*** (before May 2004 it was called Westel), ***Pannon GSM*** and ***Vodafone***. They first started operating in the mid-90s, soon becoming very successful and have divided-up the Hungarian mobile market between themselves. T-Mobile is the largest GSM mobile network provider in the country.

Deregulation of the economy in the 1990s led to an explosive and enduring growth in the mobile communications market in Hungary. This process has resulted in there being over 12 million mobile phone subscribers nationwide (120 subscribers per 100 inhabitants) by the end of 2008. T-Mobile is the leading mobile operator in the country, providing services to over 5.5 million users (44.7% of total subscribers). Pannon GSM has 4 million subscribers (33.4%) and Vodafone has nearly 2.6 million (21.9%).

Since the second half of the 1990s, mobile operators have competed with MATÁV's services. Their efforts have proven to be successful: from 2000 onwards the number of fixed phones in dwellings started to fall, whilst in 2002 the numbers of mobile phones, and the number of domestic calls initiated by mobile phones, surpassed similar indicators relating to fixed-line phones in Hungary.

After the turn of the millennium, another arena of competition opened, with a focus on





broadband network development. The latest outcome is the developing coverage network of ***3G/HSDPA*** (High Speed Downlink Packet Access) from each of the operators.

By the end of 2008, nearly 300 settlements had access to 3G networks *(Figure 151)*, but the penetration rate (14.8% in January 2008) is far from the EU-27 average (20.0 %).

The number of ***WI-FI*** (Wireless Fidelity) ***internet 'hotspots'***, promoting the use of mobile internet, has increased spectacularly.

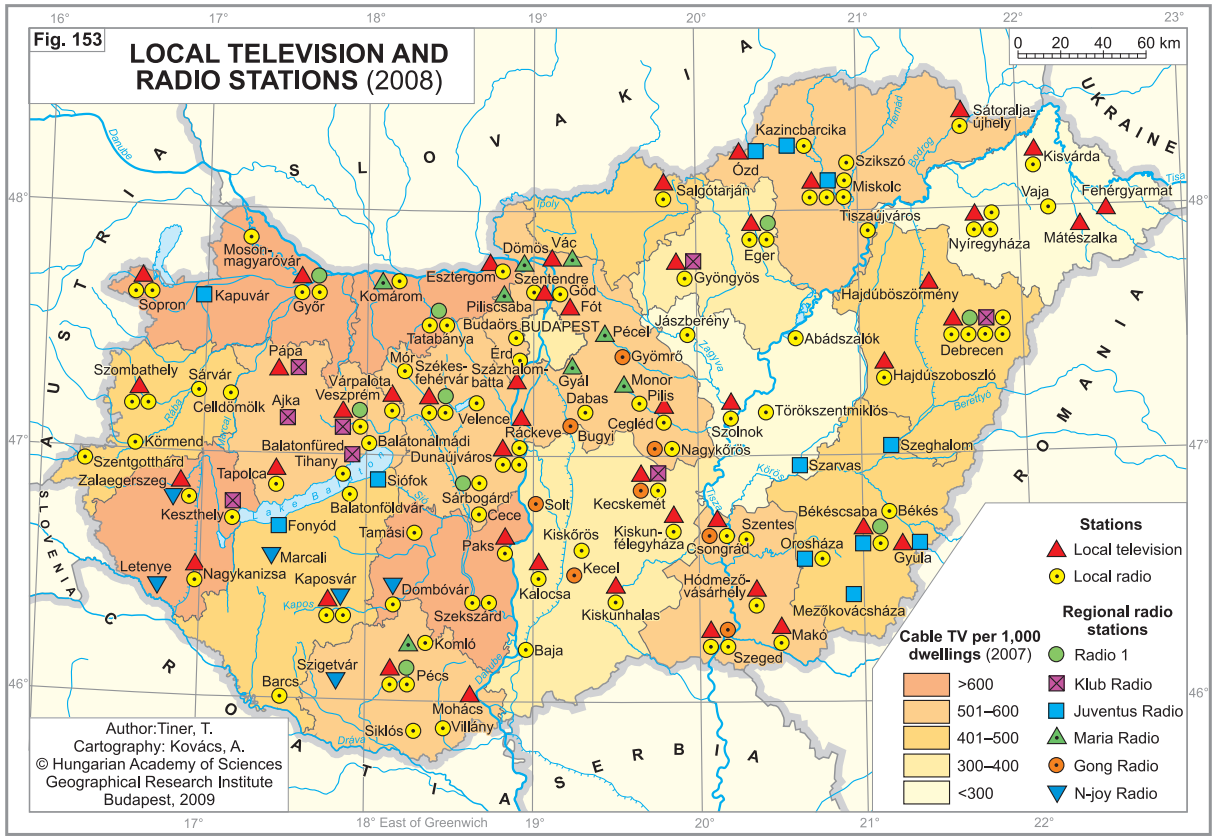
In 2008 more than 1300 registered hotspots are available for potential users all over the country; 41% of them are located in Budapest.

Looking at the map in this side, it can be seen, that the majority of hotspots can be found in publicly accessible locations (hotels, restaurants, pubs, cafés, telecottages, etc.) or in the vicinity of mobile phone towers with aerials. 51% of all hotspots can be used free in Budapest, the rest are chargeable. In towns outside of the capital, the proportion of chargeable hotspots is 56% *(Figure 152)*.

Television, Radio Broadcasting and Programming

Before the regime change, broadcasting was the responsibility of the Hungarian Post Office. The transmission network broadcast 3 nationwide, and 5 regional stations of Hungarian Radio, with the help of 63 amplifiers and other special equipment. Programs were broadcast abroad in Hungarian and foreign languages too for shorter intervals, on the short wave band. At that time, Hungarian Television broadcast only two channels nationwide, and few regional and nationality programs with the help of amplifiers.

During the 1990s, following the liberalisation of Hungarian media, several nationwide commercial television channels – besides many regional and local television and radio stations – started to broadcast over the airwaves. In addition to ***nationwide radio stations*** (Kossuth, Petőfi and Bartók), and ***television channels*** (M1, M2 and Duna TV) which are received by over 95% of the country in a fair quality, 42 local television channels offer daily programming and nearly 90 local radio stations were broadcasting in 2008 *(Figure 153.)* Dozens of both Hungarian and foreign television channels are available for subscribers via satellite or cable, and for 12% of them in digital reception quality.



Cable Television

In Hungary more than 2.1 million dwellings are connected to the cable television network, in 312 settlements. This type of service is available mostly in Transdanubia and Pest County. Several operators are active in this field (UPC, Fibernet, Diginet, etc.) and offer different packages of pro-

grams. ***UPC Hungary Ltd.***, the largest operator, was established in July 1998 by the merger of two market leading groups, Kábelkom and Kábeltel.

At that time Kábelkom was providing cable television services in 10 larger towns outside Budapest and their surroundings (Székesfehérvár, Tatabánya, Veszprém, Pécs, Dunaújváros, Eger, Szolnok, Miskolc, Debrecen and Nyíregyháza), whilst Kábeltel was providing similar services in 6 towns (Sopron, Szombathely, Nagykanizsa, Mór, Mezőtúr and Budaörs), as well as in Budapest. The merged company was 80% owned by UPC Hungary, which has become the sole owner of one of Hungary's biggest providers of broadband internet services.

In 1999 the owner of UPC gained majority ownership in the Monor Telephone Company (Monortel) acquiring the concessionary right to provide local telecommunications services in the south-eastern part of Pest County, encompassing 43 settlements.

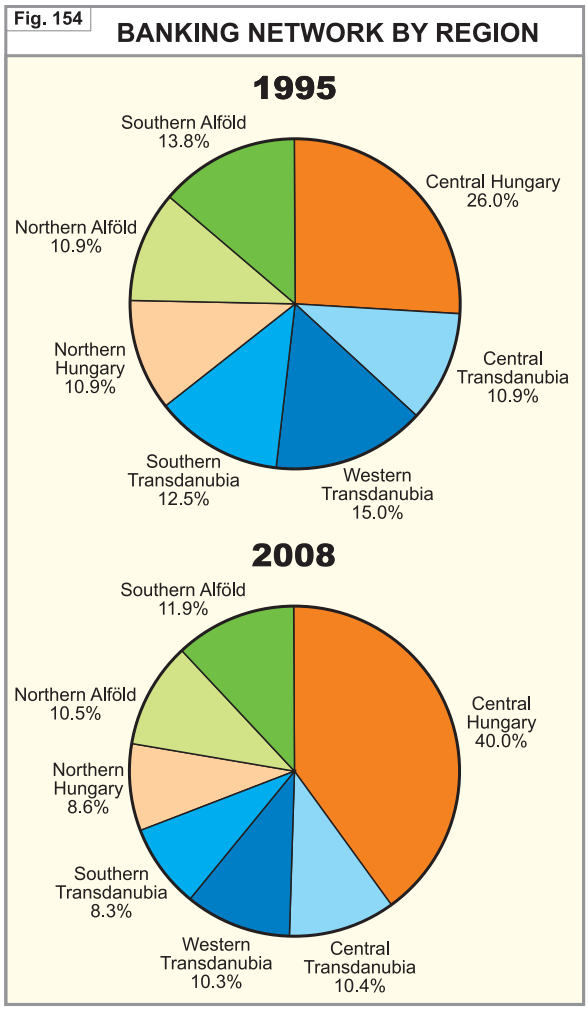
Banking Network

Balancing Branch Network Disparities During the Early Transition Period

The creation of a two-tier banking system in 1987 "re-established" modern Hungarian banking, in which today 80% of all banks are majority foreign owned. There can be no doubt that the Hungarian financial sector lagged significantly behind that of more developed countries in the 1990s, even as regards territorial distribution. The location and regional expansion of bank branches reflect economic developments in Hungary during the 1990s. Following the economic and political transition, commercial banks embarked on a rapid development of their branch networks in Hungary's western counties, a region that had been neglected during the period of socialist industrialisation.

As a result of these developments, disparities between regional branch networks had disappeared by 1990 and the previous disadvantage that western parts of the country suffered, had been eliminated. The aim of domestic financial institutions was to cover the country with an evenly distributed branch network, in what was at the time, a relatively small banking market. Branch developments in the 1990s worked towards restoring the balance between western and eastern parts of the country (*Figure 154*). Having relatively saturated the western regions, from the mid-1990s onwards, the main targets were the major towns of eastern and southern Hungary.

Fig. 154



Territorial Characteristics of the Bank Branch Network

Although the territorial enlargement of the branch network has improved accessibility to banks, the country is still conspicuous by the sparseness of its network density, especially when compared to the EU-15 average (1,923 persons/branch). Even though the number of banks is high relative to the overall size of the Hungarian market, ***branch density*** is still quite low. Despite a 76% increase in the density indicator between 1998 and 2008, the current figure of 6,061 persons per branch reveals that the country is still insufficiently covered by operating

branches (*Table 41*) and accessibility indicators of financial services continue to show considerable differences between western and eastern parts of the country. There are inner disadvantaged peripheries to be found at the micro-regional level in Transdanubia as well, and such areas dominate the regions of the Alföld (Great Hungarian Plain) and North Hungary. The ratio of bank branches per capita clearly ranks the region of Central Hungary and West Transdanubia first. As a consequence of intense development of the branch network in Budapest, the capital further increased its share in the network. While in 1997 11% of all branches operated in Budapest, this figure was already at 31% in 2008. There the network density is nearly double the national average (3,335 persons per branch). However, the poorest density and service figures are recorded in the regions of the North Alföld and North Hungary. The territorial distribution of banks clearly points to a more intense financial intermediary activity that correlates strongly with economic development (*Figure 155*).

Viewed from the perspective of the banks themselves, the network development was not primarily driven by any regional preferences,

Table 41. ***Territorial distribution of the bank branch network and branch density (1998–2008)***

Regions	Number of bank branches		Ratio of bank branches		Branch density (population per branch)	
	1998	2008	1998	2008	1998	2008
Central Hungary	304	666	32.0	40.0	9,434	4,266
– Budapest	*253*	*509*	*16.0*	*31.0*	*7,356*	*3,335*
Central Transdanubia	96	173	10.0	10.4	11,594	6,421
Western Transdanubia	114	171	12.0	10.3	8,711	5,850
Southern Transdanubia	101	139	11.0	8.3	9,762	7,032
Northern Hungary	88	144	9.0	8.6	14,591	8,827
Northern Alföld	109	175	12.0	10.5	14,073	8,810
Southern Alföld	132	198	14.0	11.9	10,295	6,843
Hungary	**944**	**1,666**	**100.0**	**100.0**	**10,736**	**6,061**

Source: Calculated by the author, based on yearbooks of the Hungarian Financial Sector and Stock Exchange

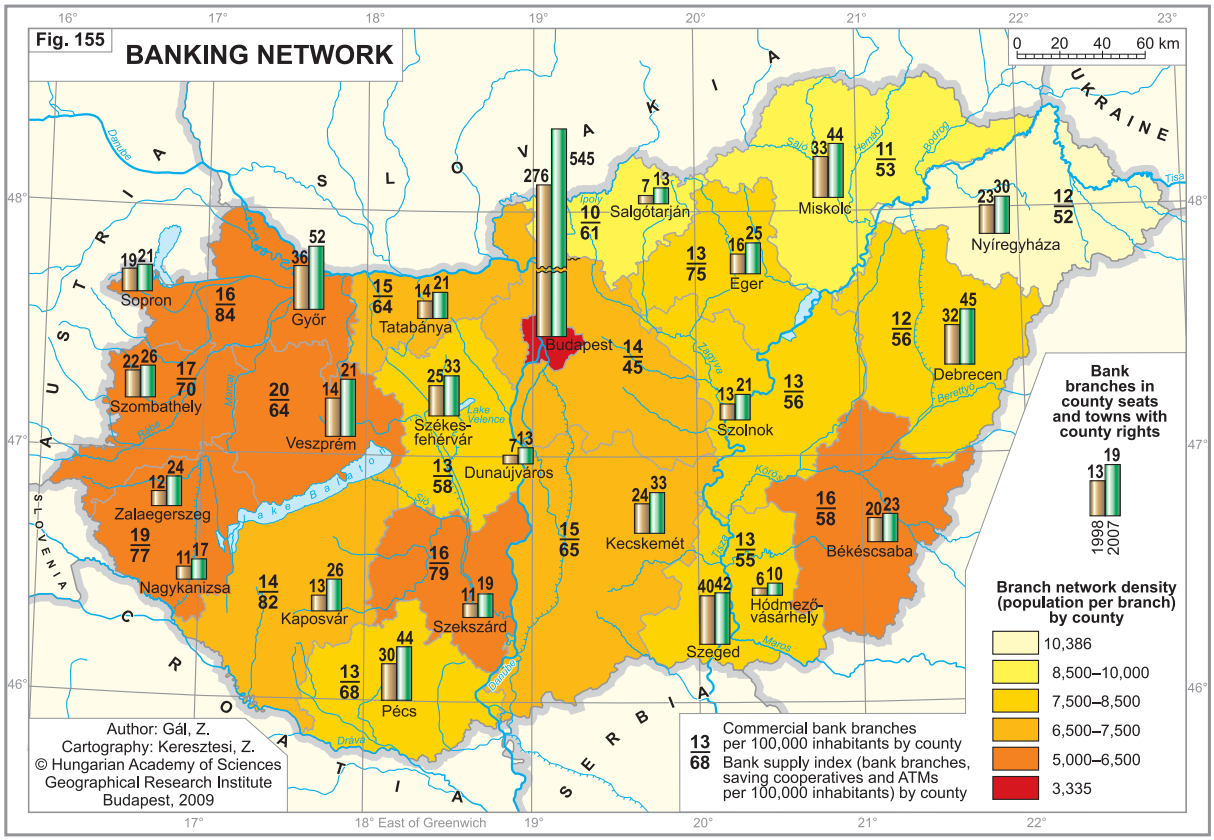


Table 42. ***Distribution of the bank branch network by settlement category by size (1998–2004)***

Settlement category by size	Number of settlements	Ratio of population	Territorial ratio of branches		Network density (Population per branch)	
	2004	2004	1998	2004	1998	2004
1,000–1,999	641	9.0	0.6	0.2	230,771	461,543
2,000–4,999	505	14.8	7.3	6.2	29,826	29,252
5,000–9,999	136	9.2	13.0	12.0	10,408	9,378
10,000–49,999	122	22.6	36.9	41.5	8,961	6,612
50,000–99,999	12	7.5	17.8	17.9	6,109	5,057
100,000–	8	11.4	24.4	22.2	6,807	6,192

Source: Calculated by the author from the Handbook of the Hungarian Financial & Capital Markets (2004).

rather it was directed by the urban hierarchy. During the early stages of network enlargement, banks attempted to provide countrywide coverage while following the hierarchy of settlements, i.e., starting with regional centres and county seats, then proceeding onto smaller urban centres. Given that by the early 1990s the number of bank branches had equalled the number of major cities, financial institutions turned their attention to towns with smaller populations. Formerly, cities represented a 50% share of the branch network (or 60% by including Budapest). This figure fell to 22% due to the opening of branches in smaller towns (*Table 42*). Today, the bulk of the branch network (41.5%) is located in towns with 10 to 25 thousand inhabitants. At the same time, the accessibility of services corresponds with the economic prosperity of individual towns. The relative positions of larger towns are best characterised by reference to the range of financial services offered and the intensifying competition among banks rather than the mere enlargement of branch networks. In terms of these indicators, some cities (Pécs, Győr, Debrecen, Miskolc and Szeged) could be viewed to have started to assume the status of financial centres. In settlements with populations of between 5 to 50 thousand, branch networks have slightly enlarged, while in those with populations of 2 to 5 thousand, the number of branches has decreased.

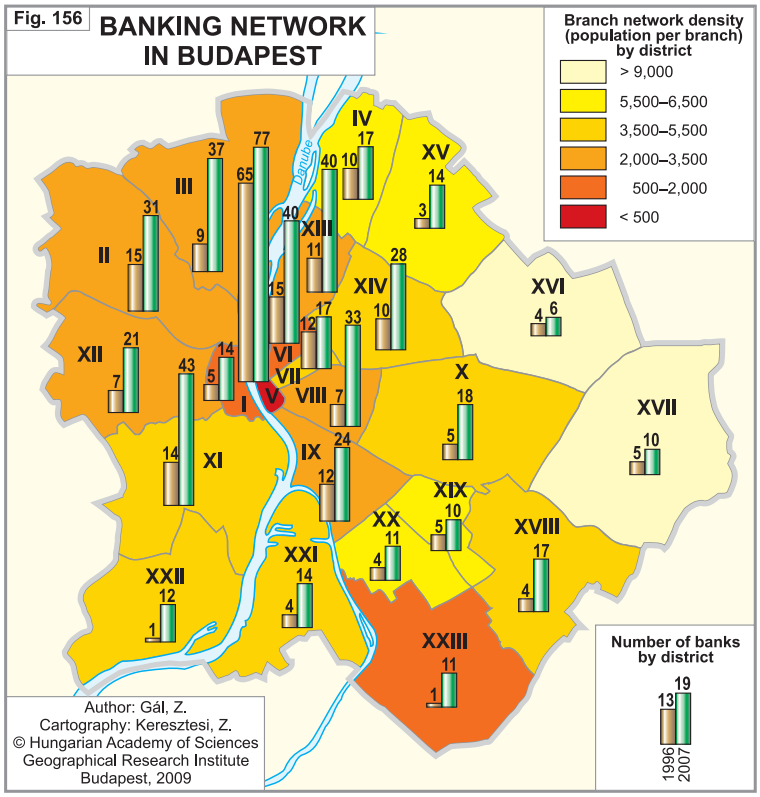
Territorial Polarisation of the Banking System

Among all of Hungary's economic sectors, territorial concentration and polarisation are highest in the banking and insurance sectors. The banking sector is characterised primarily by strong organisational centralisation and territorial polarisation, the latter being crucially reflected in a centralisation bias of the entire sector highly concentrated on Budapest. Following a decade of territorial expansion in the banking network, organisational centralisation appears to have become more dominant in the early 2000s.

– This means that virtually 95% of ***banking capital stock*** and 86% of those ***employed in the financial sector*** (registered at company headquarters) are ***concentrated on Budapest***. Since banks tendered for privatisation were exclusively located in Budapest and so were greenfield banking investments, in effect 100% of capital invested in the sector is concentrated here (*Figure 156*).

– The Hungarian banking sector is characterised by the ***lack of locally founded banks***. Only mutual savings cooperatives, with their significantly lower equity base (5.2% of total Hungarian bank capital) have their headquarters outside the capital. These mutual savings cooperatives, which previously had 1.8 times as many branches as the banks, today account for only 51% of all branches of financial institutions, owing to a more rapid expansion in the bank branch network.

– The main cause of polarisation is the ***strongly centralised hierarchical control of the branch network***. Due to this structure, the competencies of branches outside the capital are restricted. In some cases, even their access to information is limited (informational asymmetry).



– A further cause of polarisation is the ***relatively low level of access to services throughout the country***. This is manifest in the highly uneven territorial distribution of branch networks in terms of both urban hierarchy and regional levels.

Against the general tendency observable in the EU, consolidation in the Hungarian market was not accompanied by a decrease in the number of branches. On the contrary, the Hungarian branch network continued expanding until the financial crisis of 2008, with the most rapid pace in the last 2 ½ years witnessing the opening of 400 new branches. This was more than had been opened during the entire previous decade, reinforcing the advantage of the central region on the expenses of the rest of the country (*Figure 154*). The current state of accessibility to financial services is most importantly characterised by the concentration of such services in the capital, contrasted with the almost total absence of banks in rural areas (i.e. villages). At present, branches of commercial banks operate in 223 settlements, 99% of which are towns. To put it differently, bank branches are virtually absent from villages, which account for 93% of all settlements. While nationwide the ratio of population per bank branch improved by 18% between 1998 and 2004, this figure worsened by 5.3% in microregions which display the worst branch accessibility figures. The number of microregions with access figures below the national average increased from 97 to 102. Domestic banks continue to resort to the so-called "redlining strategy" not only in network development but also with regard to certain service segments. Organisational centralisation, rationalisation of branch networks (sometimes resulting in financial exclusion, i.e. the closing down of branches in some less profitable regions and socially segregated residential areas), and the organisational and territorial concentration of certain back office activities further widened the gap between Budapest and the rest of the country. The peculiarity of these negative developments – in contrast to those in Western Europe – is that they began before branch networks of a reasonable size had been established.

Internal Trade

The term 'internal trade' covers a diverse range of activities supporting the flow of goods from the producer to the 'final' consumer, including wholesale, and a series of intermediary actions by the logistics and retailing sectors. To capture the increasing complexity of tasks related to the flows of goods, and the changing socio-economic context of trade, the restructuring of the wholesale, retail and consumption spheres in Hungary should be interpreted in the light of the integration of the national economy into the global circulation of capital, as well as in the specific socio-cultural context of post-socialist era transition.

Recent spatial developments have been in the context of rapid structural shifts stemming from the transition process. Although the sector (particularly retailing) was the scene of a whole series of innovations for the centrally planned system from the early 1970s onwards (e.g. self-service grocery stores and construction of department stores), along with new, 'alternative' forms of retail introduced by 'private' entrepreneurs, the structural and spatial deficiencies remained and stimulated an enterprising 'rush' into the sector from 1989 on. The ***entry of small-scale domestic firms to the market, en masse***, was also encouraged by national policies that aimed to channel national (and international), social and financial capital into the national economy in order to stimulate restructuring and manage the crisis during the transition. The retail and wholesale sectors were the primary scenes of the ***accumulation of 'small capitals'*** until the mid-1990s, due to the privatisation of major state-owned companies, to the highly liberalised (and in many ways unregulated) conditions for founding and running enterprises and opening shops, and also to the relatively low capital intensity and its rapid circulation.

As a result, internal trade showed ***increasing competition*** along with ***fragmentation of the sector*** in terms of capital, organisation and space. Nevertheless, declining purchase power (in terms of real wages), stricter regulations, and ***competition*** stimulated primarily by the ***entry of international retailers*** and property developers, resulted in fundamental structural changes in the sector. ***From the mid-1990s on***, there was a shift toward 'large scales' (***concentration***) in terms of capital and organisation: the number of firms (particularly, small ones run by individual entrepreneurs) was declining, while the number of shops was stagnating or only slightly increasing (*Figure 157*). Concentration was also an ongoing process in terms of the ***vertical integration*** of the flows of goods: the distribution process, and increasingly, the production of goods were organised and controlled by retailers. Changing the balance of power in the value chain was a strategic approach of ***major international retail corporations***, as well as of domestic agents that joined ***buying groups, franchise networks*** and other forms of associations, that grew successful competitors of powerful agents of the market. Meanwhile, the majority of independent domestic firms suffered from significant losses in terms of market share and margins.

Internal trade was increasingly ***embedded into international flows***, due to the ***liberalisation*** in the flow of goods and the ***entry of international retailers and wholesalers***, particularly, from 2001 on (*Figure 158*). The process was spurred by increasing household incomes, the development of banking services and pent-up demand for durable goods. Foreign direct investment got new stimuli with Hungary's EU-

Fig. 157

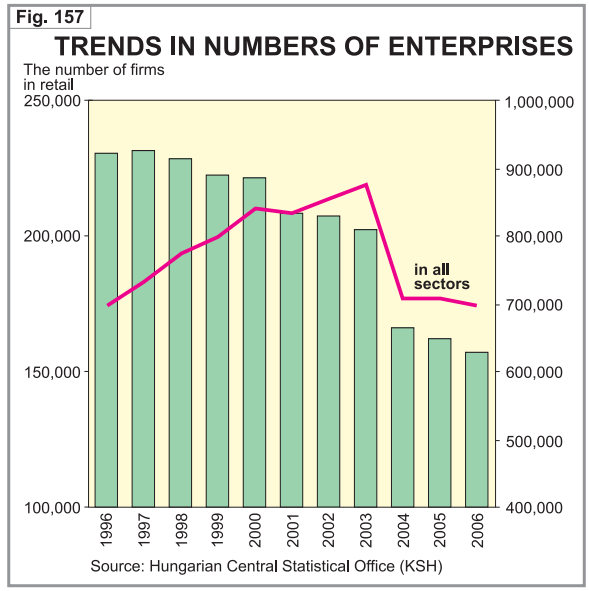
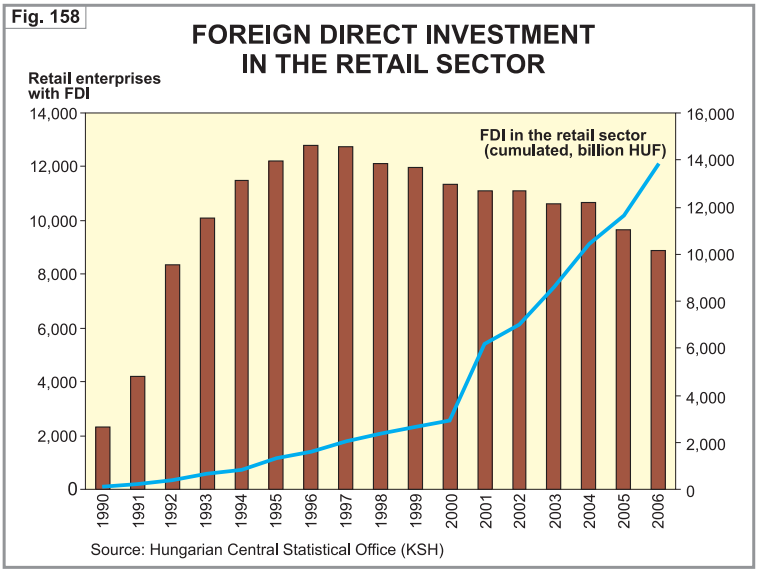


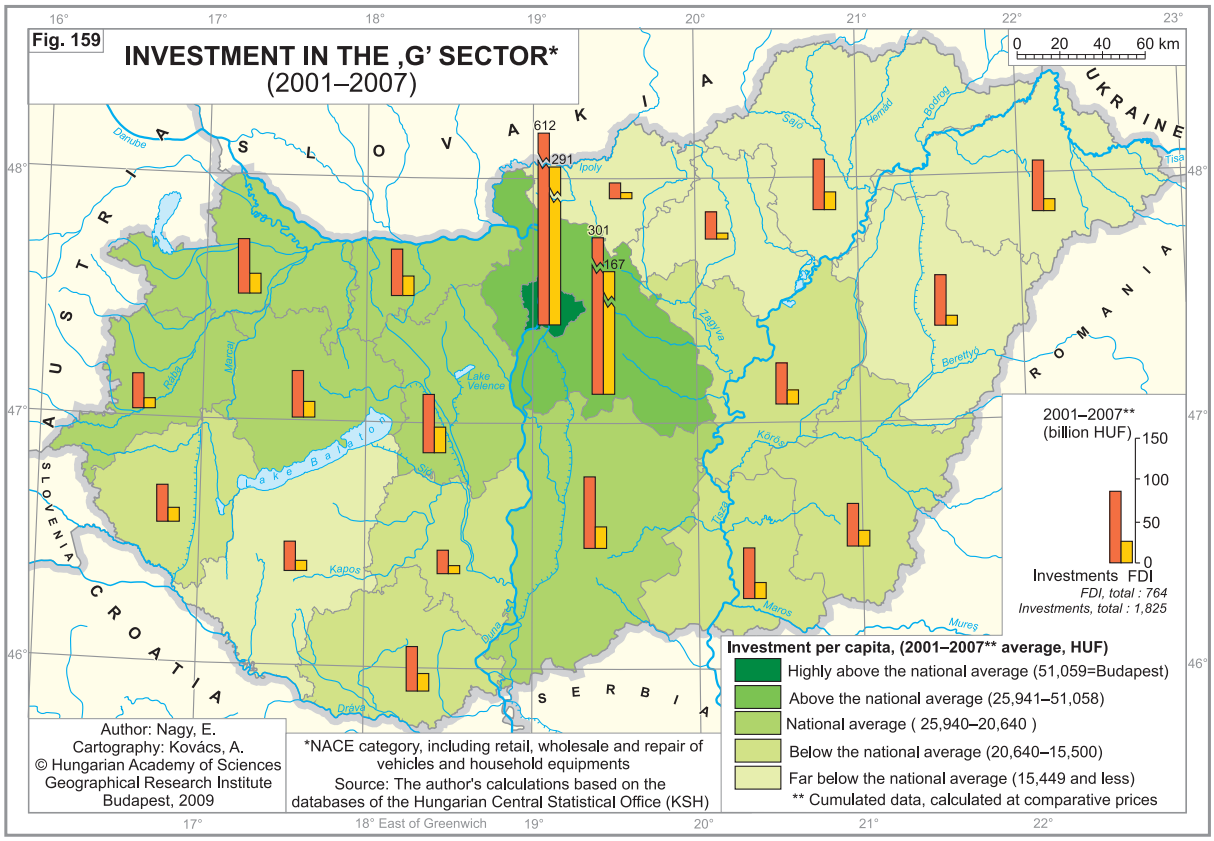
Fig. 158



accession in 2004 (the share of the sector rose from 12.6% up to 15.3% of FDI between 1996 and 2006). Although international agents had to adapt to the rapidly changing conditions and a new (emerging) culture of consumption, their expansion was spectacular and had a key role in the restructuring of internal trade. The success of ***transnational retailers*** rested not only on their ***organisational culture*** and ***financial resources***, but also on their reputation vis-à-vis domestic retailers in the 1990s. Moreover, international agents were able to ***exploit deficiencies of national and local regulations*** that left the key issues, such as opening hours, supplier-retailer relations and the localisation of new developments, unregulated.

The entry of transnational firms ***accelerated the introduction and spread of innovations*** in distribution and retailing, the organisation of retail space, new retail forms (hypermarkets, classical indoor shopping malls, and strip malls, discount stores, etc.), quality control systems and public relations (e.g. market research). The spatial expansion of ***FDI in retail and wholesale*** (*Figure 159*) made such innovations widespread throughout the national economy. The spread of FDI was also fed by competition, reinforced by Hungary's EU-accession (e.g. the entry of Lidl and Aldi into the grocery sector), by the ***rise of successful domestic retailers*** (e.g. Coop, CBA and Reál chains on the food market) and the stricter control of transactions

Fig. 159



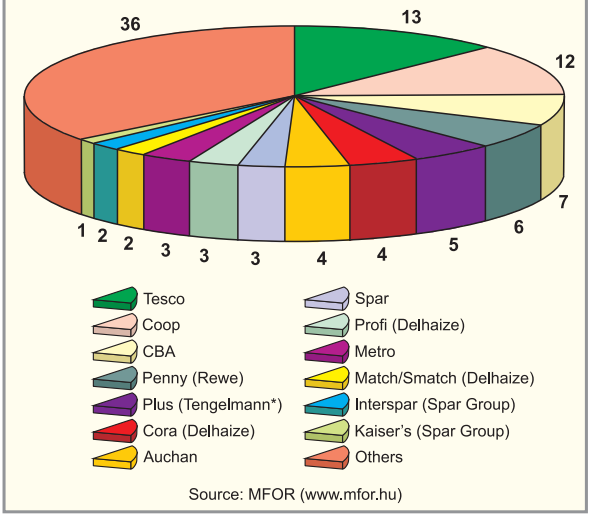
(i.e. consumer protection, retailer-supplier relations, ethical business practices, and the introduction of compulsory quality control systems).

Although, the shift toward a ***more regulated business environment*** challenged all agents in the sector, tighter control and competition primarily affected small-scale independent retailers. The highly contested arena of ***food retail*** was a scene of a particularly ***rapid concentration*** in the 'post-EU accession' period, which is reflected by the dominance of a small number of agents on the market: the 10 largest agents (together, operating 13 chains) controlled 64% of the market (*Figure 160*). The concentration continued in 2007 and 2008, as new discount stores entered the market (expanding primarily at the expense of small independents) and a new wave of mergers and acquisitions began.

From the mid-1990s on, macro-economic stability and growing domestic demand have stimulated the ***introduction of new retail forms by international agents*** – probably, the most profit-yielding type of innovations in the sector. The first organisational novelties were introduced in the form of ***supermarkets***, the ***discount store*** and the ***DIY*** (Do it yourself) segment, that was followed by the 'success story' of ***hypermarkets*** and ***shopping mall*** developments from the late 1990s on. The market share of new retail formats (and that of firms developing and/or running them) was increasing rapidly, and induced unprecedented structural changes in the market: hypermarkets, discount stores and supermarkets had a 60% share in 2007. Meanwhile,

Fig. 160

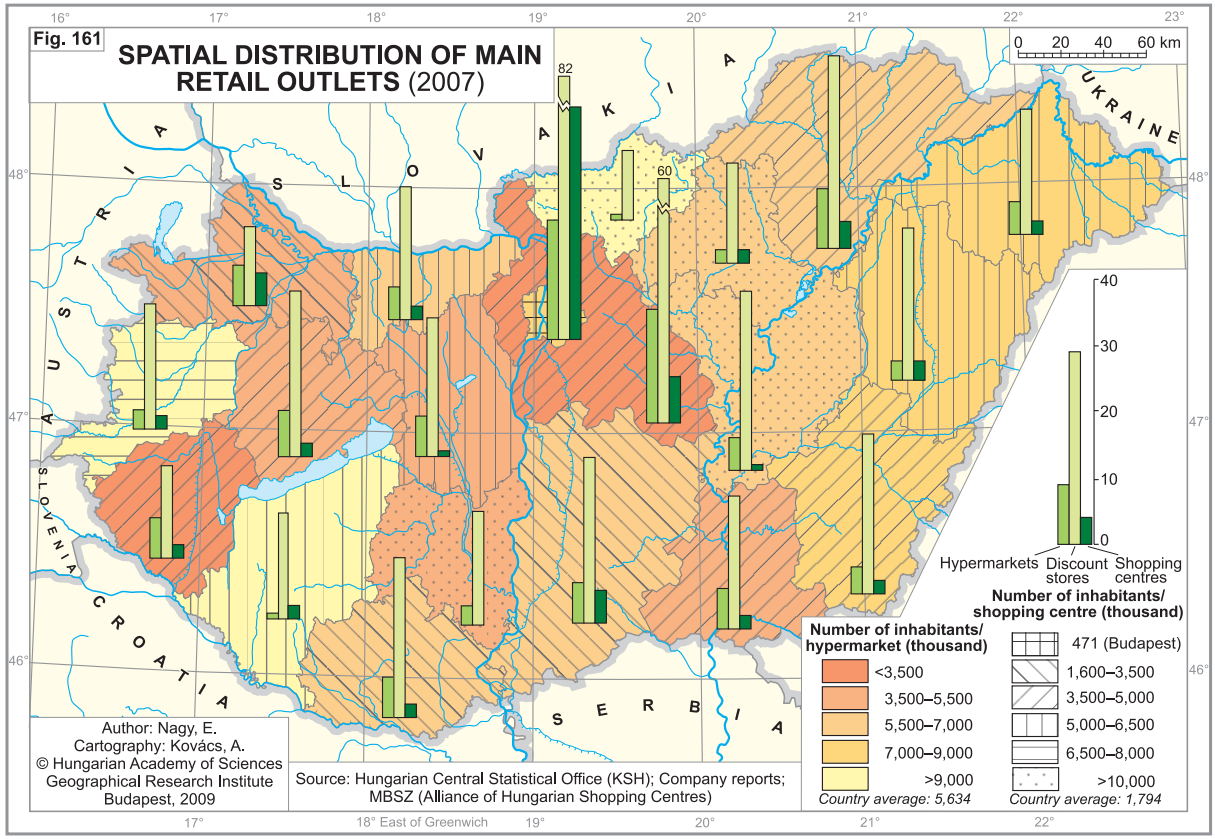
MARKET SHARE OF THE LARGEST RETAILERS IN THE FMCG (DAILY GOODS´) SECTOR (%)



Source: MFOR (www.mfor.hu)

Fig. 161

SPATIAL DISTRIBUTION OF MAIN RETAIL OUTLETS (2007)



Author: Nagy, E.
Cartography: Kovács, A.
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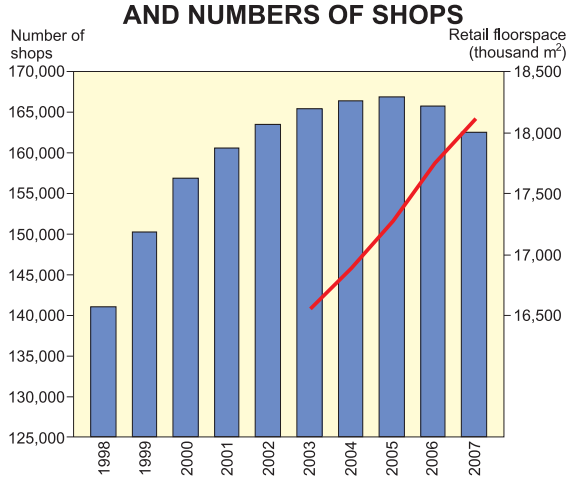
Geographical Research Institute
Budapest, 2009

Source: Hungarian Central Statistical Office (KSH); Company reports; MBSZ (Alliance of Hungarian Shopping Centres)

shopping mall developments (enclosed, 'traditional' forms and later, 'strip malls') challenged not only small food retailers, but (much rather) specialist shops in the segments of apparel and of durables. This retail form stimulated a ***concentration*** in terms of capital, organisation and space, but provided a ***scene for globalisation*** (e.g. in the fashion industry).

Fig. 162

CHANGES IN RETAIL FLOORSPACE AND NUMBERS OF SHOPS



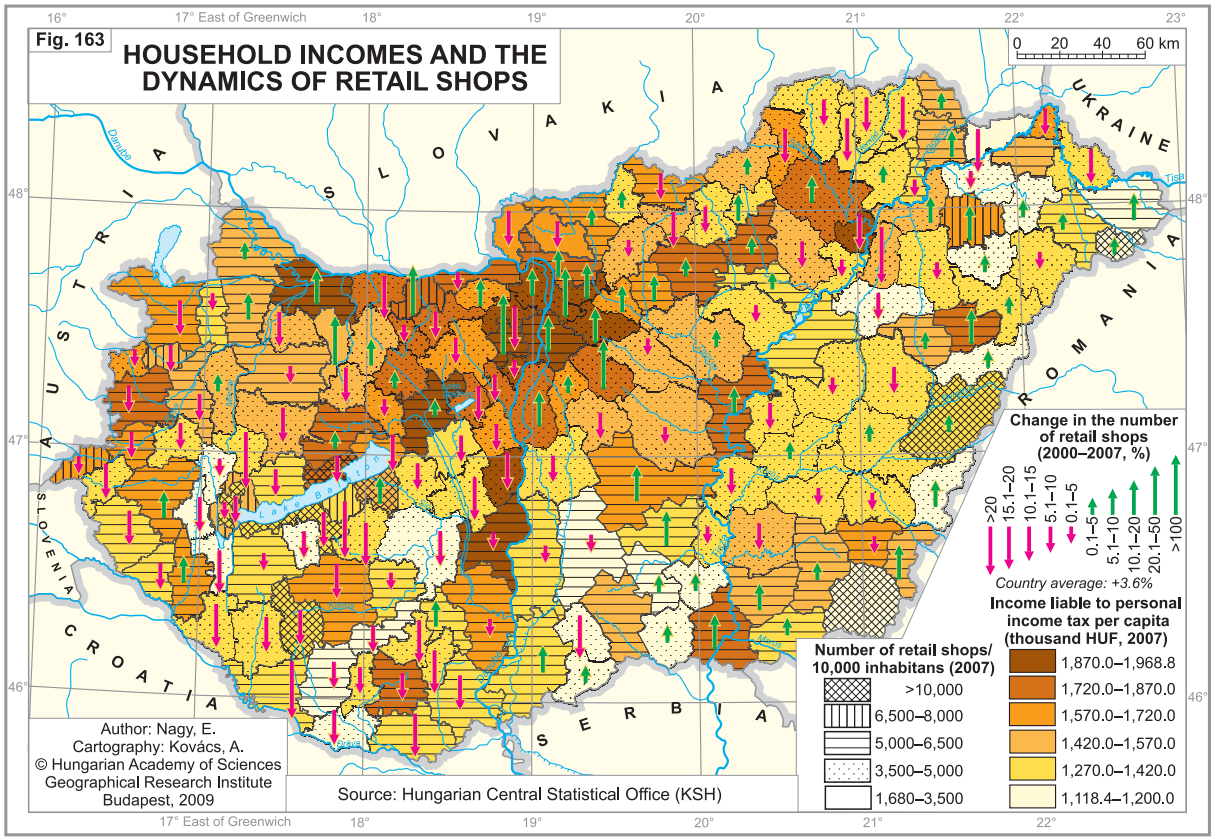
Source: Hungarian Central Statistical Office (KSH)

The above process rested on retail developments that were ***focused*** not only on ***Budapest*** and its urban region, but shifted to ***major*** and later, to ***medium-size county towns*** from 2000 on (*Figure 161*). Discount store developments and Tesco's 'mini-hyper' strategy (a response to the price competition stimulated by 'hard discounters' from 2007 on) reached even smaller towns (mostly, having at least 20,000 inhabitants). Nevertheless, the ***introduction of new retail forms*** was ***a spatially differentiated and hierarchical process***, and their spread – as well as the falling domestic demand from 2006 on – accelerated the shift to an ***increasingly uneven spatial structure in retail and consumption***.

The concentration of internal trade was reflected by ***the increasing spatial concentration of retail activity*** at a macro-level: the number of shops was stagnating and (from 2005 on) declining, while ***retail floor space*** was ***increasing*** rapidly (*Figure 162*). The growth of space for retailing continued to be focused largely (50%) on the ***Budapest region***. Spatial inequalities are more evident by focusing on smaller spatial scales: microregions of higher income status (the wider Budapest region, ***major county towns*** and ***economically dynamic regions*** in the north-west)

Fig. 163

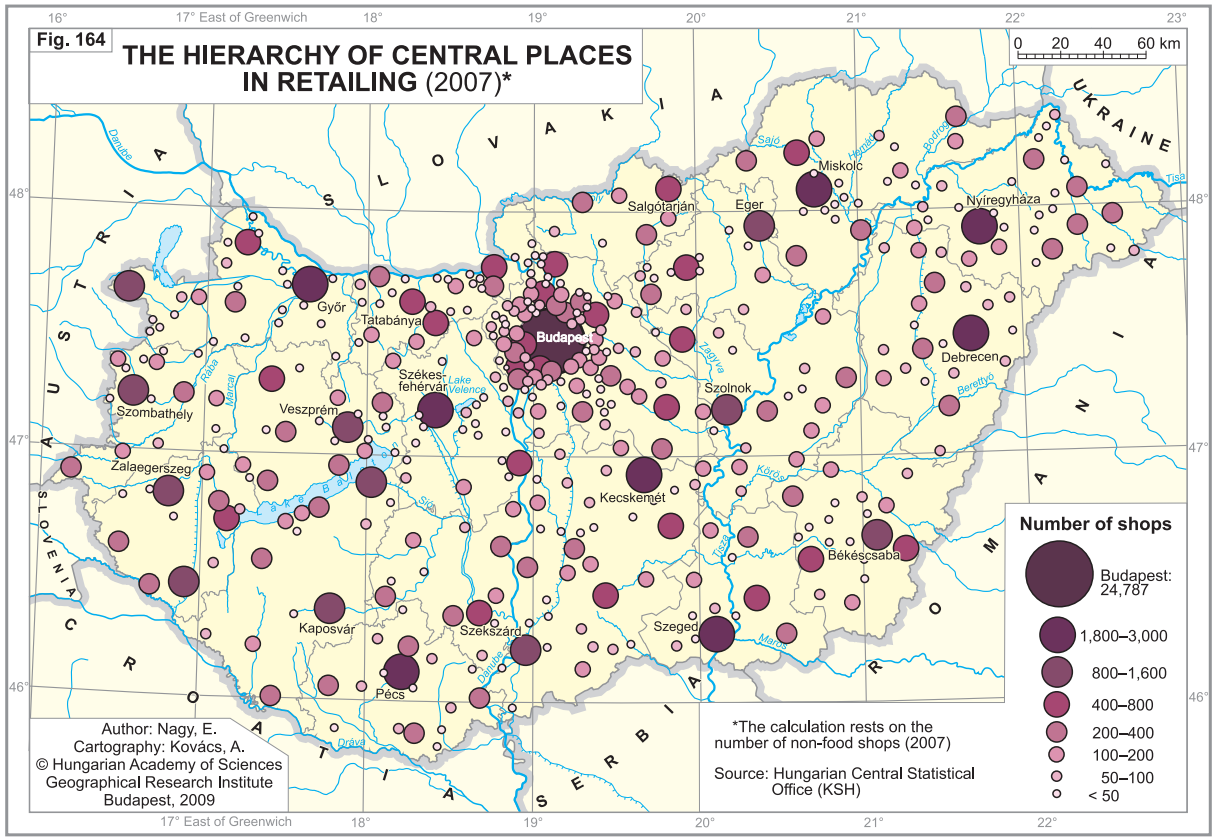
HOUSEHOLD INCOMES AND THE DYNAMICS OF RETAIL SHOPS



were the predominant scenes for store openings (*Figure 163*) and also for the introduction of new retail forms (*Figure 161*), nevertheless, large-scale developments involved shop closures in a relatively high number, particularly from 2006 on, when the dynamics of the domestic market had exhausted. The low-income areas seem to be the losers of spatial restructuring: only 10 out of the 82 below-average regions had more shops in 2007 than five years before (*Figure 163).*

While ***shopping facilities*** were increasingly ***concentrated in urban centres***, the urban network was highly differentiated: towns of the same size by population took different development paths (*Figure 164*). ***Budapest*** and its region was deeply embedded in the flow of goods, acting as the focal point for not only a major stake of retail investments, new forms and other innovations, but also the business headquarters of key agents in the sector, as well as the distribution centres supporting domestic supply and international trade. The ***mushrooming commercial developments stimulated a de-concentration*** of retail and distribution spaces (*Figure 165*) that rests largely on Budapest's role in internal as well as in international trade. Spatial concentration and de-concentration were ongoing processes also outside the capital city and its region: shopping facilities were increasingly focused in large and medium-size towns, and increasingly on their fringes, re-drawing shopping routes and habits – while rural regions with small centres suffered from lacking retail developments and the decline of local retail (*Figure 164*).

The spatial restructuring of internal trade was conditioned by the ***rapid integration of the domestic market into international flows***, and also by the ***particular conditions of post-socialist era transition***, such as the changing social context of consumption and deficiencies in the operation of institutions controlling the market, mediating business norms (giving rise to blossoming 'black' activities, abuse of market powers, etc.). Peculiar conditions, along with neoliberal policies employed from the mid-1990s on, stimulated an unprecedented concentration of retailing and distribution, moreover, through supply channels, a re-organisation of spaces of production. The discussed processes raised new dimensions of spatial differences and inequalities at different geographical scales, ***reinforcing the economic power of Budapest***, changing the relations of urban centres and their hinterland, and transforming our daily experiences and social practices.



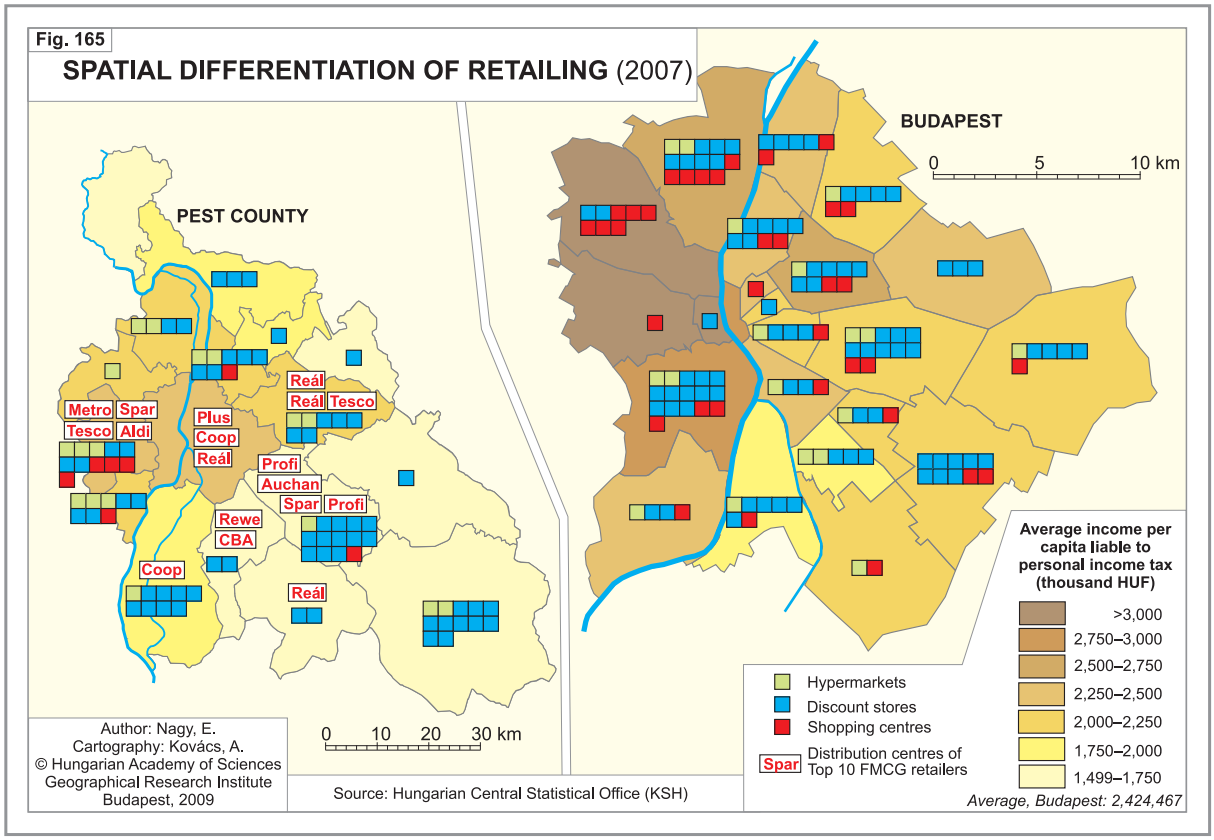


Fig. 165
SPATIAL DIFFERENTIATION OF RETAILING (2007)
PEST COUNTY
BUDAPEST
0 5 10 km
Metro
Spar
Tesco
Aldi
Plus
Coop
Reál
Reál
Reál
Tesco
Profi
Auchan
Spar
Profi
Rewe
CBA
Coop
Reál
0 10 20 30 km
Author: Nagy, E.
Cartography: Kovács, A.
© Hungarian Academy of Sciences
Geographical Research Institute
Budapest, 2009
Source: Hungarian Central Statistical Office (KSH)
Hypermarkets
Discount stores
Shopping centres
Spar Distribution centres of Top 10 FMCG retailers
Average income per capita liable to personal income tax (thousand HUF)
>3,000
2,750–3,000
2,500–2,750
2,250–2,500
2,000–2,250
1,750–2,000
1,499–1,750
Average, Budapest: 2,424,467

Foreign Trade and Capital Exports

Foreign trade

Overall figures. For a long time Hungary has been a small, open, yet foreign trade sensitive country and, as a consequence, a vulnerable economy. Its GDP growth rate is closely allied to its commercial success abroad. Exports used to be the key driving force behind economic growth (together with inward FDI). Due to a liberalised domestic market that is comparatively small, any attempts to counterbalance lower exports by boosting domestic demand, are doomed to fail. Economic vulnerability can only be addressed with increased competitiveness and sustained openness, certainly not by closing-down, even during a period of economic crisis combined with growing protectionist trends.

Between 1995 and 2008, Hungary's exports increased from less than EUR 10 billion to almost EUR 73 billion (a growth of more than 700%), while imports grew 6-fold, from EUR 11.7 billion to EUR 73 billion *(Table 43)*. In other words, foreign trade has proven to be more dynamic than GDP growth, resulting in a continual increase in openness, with respect to both exports and imports. Today, Hungary is the most internationally integrated economy of all the new EU member countries, as evidenced by the geographic orientation of its foreign trade, as well as the striking trade surplus with the EU and deficit with non-EU countries (which is greatly contributed to by energy imports from Russia).

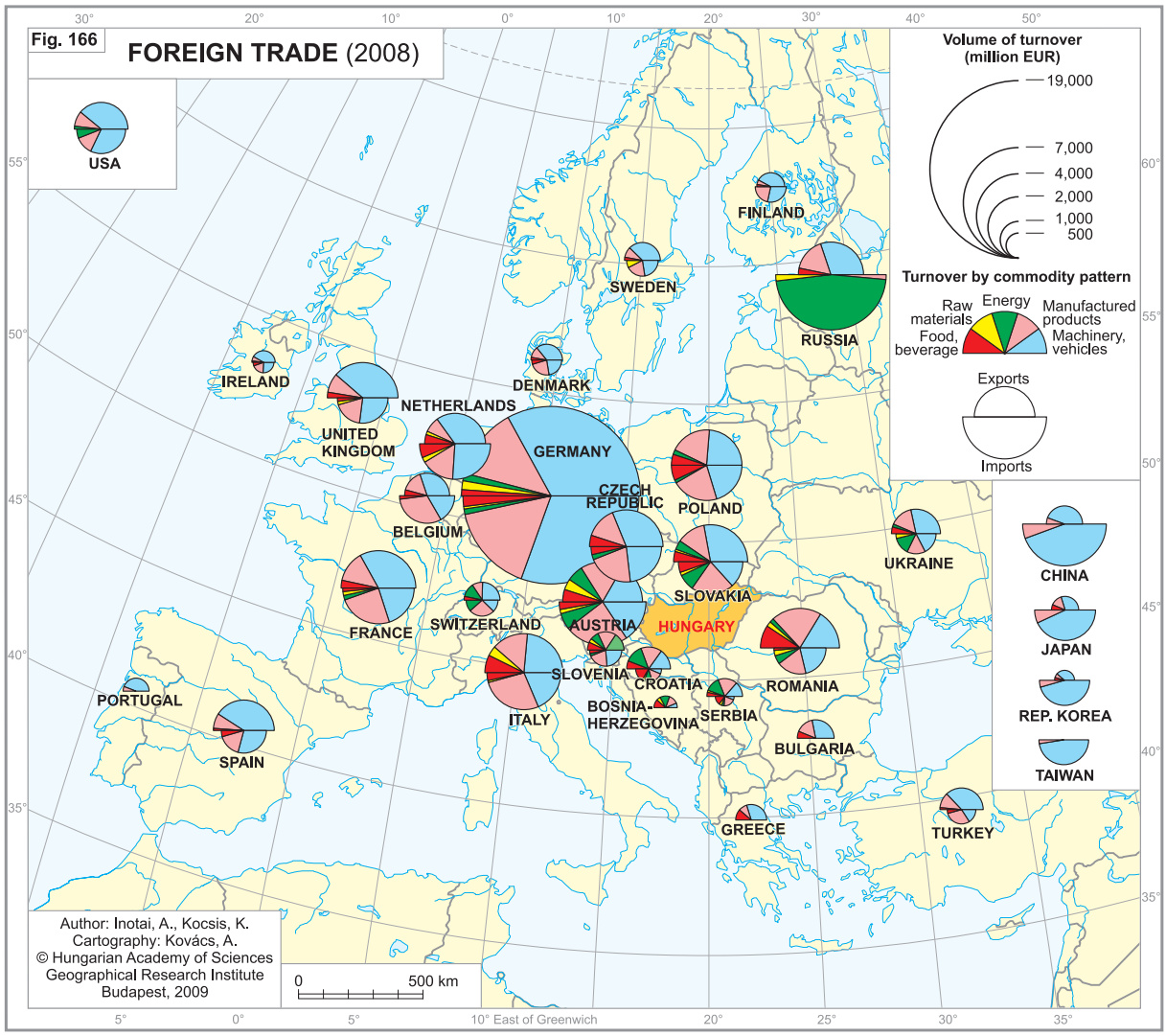
Geographic orientation of trade. Pre-1989, Hungary had already become the leading East Central European economy for trade with non-Comecon (CMEA) markets. Although the collapse of the CMEA came as a big shock to the economy, the geographic reorientation of trade relations was largely complete within a few years, even if this was not without pain in terms of heavy economic and institutional losses. By 1995, 71% of exports were destined for the EU-25 member states whilst 69% of imports came from this region. Further important shifts occurred as a result of Hungary's EU accession in 2004. First, trade started to show particular dynamism with respect to other new member countries. Their share of total Hungarian exports grew from 7.5% in 2003 to 20.9% in 2008. Imports also saw a sharp increase, but their share remained much lower than that for exports (14.7%). Second, the relative share of the EU-15 started to decrease substantially, from over 60%, to the 50% range. Third, the proportion of trade with extra-EU countries grew, for the trade-creating impacts of EU integration were mainly absorbed well before accession. Hungary's extra-EU orientation is a result of its competitiveness, the global interests of multinational companies located in Hungary and the rapid growth in emerging markets (Russia, China and the West Balkans). Following EU accession, Hungary became one of the largest exporters to the extra-EU among all the new members, second only to Poland. Moreover, it is the second largest exporter from the accession states to the ex-Soviet Union (mainly Russia) again following Poland, to the USA (closely following the Czech Republic), to the West Balkans (following Slovenia, thanks to its regional heritage and personal networks) and to China (slightly lagging behind Poland).

Germany has remained by far the most important export market and supplier to the Hungarian economy (*Figure 166, Table 44*). Its share exceeds one quarter of both total exports and imports, which is five times higher than the share of the second biggest export market for Hungary (Italy, closely followed by Romania), and almost three times higher when comparing

Table 43. ***Hungary's foreign trade (2008)***

Region	Export	Import	Balance	Export	Import
	Million EUR			% of total	
EU-27	56,929	49,649	7,279	78.2	68.0
– new EU members (12)	*15,230*	*10,709*	*4,521*	*20.9*	*14.7*
Extra-EU	15,911	23,348	- 7,438	21.8	32.0
Total trade	**72,838**	**72,997**	**- 159**	**100.0**	**100.0**

Source: Hungarian Central Statistical Office (www.ksh.hu)



the aggregate export and import figure for Russia, Hungary's main supplier of energy. However, it should be taken into account that Hungary's exports to Germany to a growing degree do not reach end-consumers in Germany, rather they are integrated into German assembled products that are subsequently exported around the world. As a result, global economic trends in general, and the growth of emerging markets heavily targeted by German exports in particular, play an important role in assessing the prospects of Hungary's exports. Similarly, at least half the imports from China are not directly sold into the Hungarian consumer market but are exported to other countries either without modification, or after differing degrees of manufacturing input. Thus, in the age of globalisation traditional bilateral trade statistics can often provide ambiguous information.

Trade balance. Following the years of transition, Hungary's overall trade balance showed a substantial deficit. For over a decade, one of the key strategic tasks of economic policy had been the financing of the trade deficit. Following EU accession several positive shifts occurred. In 2007 and 2008, Hungary's overall trade became balanced (even showing a slight surplus in the first half of 2008). This was due to three, partly contradictory developments. Firstly, in contradiction with the traditional trade theory that predicts a trade surplus for more, and a trade deficit for less developed member countries of a free-trade area, Hungary achieved a substantial surplus with the EU-15. Secondly, Hungary's original deficit with the new member countries of about EUR 500 million in 2003–2004, turned into a substantial surplus of EUR 4.5 billion in 2008. Thirdly, both surpluses were able to finance the growing deficit with non-EU countries. The latter can be divided into two basic categories, with Russia exporting energy, and

Table 44. ***Hungary's foreign trade by main partners (2008)****

Country	Export	Import	Balance	Export	Import
	Million EUR			% of total	
Germany	19,384	18,523	861	26.6	25.4
Italy	3,864	3,069	795	5.3	4.2
Romania	3,682	1,567	2,115	5.1	2.1
Austria	3,578	4,462	- 884	4.9	6.1
Slovakia	3,464	2,591	873	4.8	3.5
France	3,410	3,192	218	4.7	4.4
United Kingdom	3,287	1,402	1,885	4.5	1.9
Czech Republic	2,940	2,776	164	4.0	3.8
Poland	2,877	2,889	- 12	3.9	4.0
Russia	2,635	6,842	- 4,207	3.6	9.4
Netherlands	2,090	3,274	- 1,184	2.9	4.5
Spain	2,011	1,067	944	2.8	1.5
USA	1,677	1,335	342	2.3	1.8
Ukraine	1,467	1,050	417	2.0	1.4
Belgium	1,238	1,698	- 460	1.7	2.3
Croatia	1,155	270	885	1.6	0.4
Serbia	1,039	244	795	1.4	0.3
China	759	4,177	- 3,418	1.0	5.7
Japan	336	1,903	- 1,567	0.5	2.6
South Korea	247	1,243	- 996	0.3	1.7
Taiwan	42	1,324	- 1,282	0.1	1.8

Remark: * exports and/or imports (above EUR 1 billion).
Source: Hungarian Central Statistical Office (www.ksh.hu) and own calculations.

East Asian countries supplying input raw materials and components for the export oriented manufacturing sector in Hungary *(Table 45)*. As a result, both a huge bilateral trade surplus and deficit situation emerged. In 2008, Hungary's trade with Romania indicated the highest surplus, followed by that with the United Kingdom, Spain, Croatia, Slovakia, Italy and Germany. The highest deficits were recorded in trade with Russia, followed by China, Japan and Taiwan.

Changes in commodity pattern. During the time of the change of regime, Hungarian exports were extremely divided structurally, characterised by high-tech exports to the CMEA (e.g. machinery, electrical and electronic goods, optical and precision instruments, pharmaceuticals, etc.), in contrast with labour and raw material intensive exports to more developed countries (e.g. textiles, clothing, steel and petrochemicals). By 2008, as a result of more than a decade of structural transformation and largely due to the multinational companies located in Hungary, the commodity pattern of exports had changed dramatically. Today, more than 60% of total exports (the same figure for the EU and 62% for the extra-EU region) consist of machinery and vehicles, to a large extent comprising medium and high-technology goods *(Table 46)*. Other manufactured products represent more than one quarter of total exports, while agricultural goods have a share of 6.5%, as a result of structural shifts, but also as a consequence of seri-

Table 45. ***Balance of Hungary's foreign trade (main bilateral surplus and deficit relations, 2008)****

Country	Export		Country	Import	
	million EUR	coverage**		million EUR	coverage**
Romania	2,115	235	Russia	4,207	39
United Kingdom	1,885	234	China	3,418	18
Spain	944	188	Japan	1,567	18
Croatia	885	428	Taiwan	1,282	3
Slovakia	873	134	Netherlands	1,184	64
Germany	861	126	South Korea	996	20
Italy	795	105	Austria	884	80
Serbia	795	426			

Remarks: *Surplus and deficit position (above EUR 500 million).
**Export/import coverage (imports = 100).
Source: Hungarian Central Statistical Office (www.ksh.hu) and own calculations.

Table 46. ***Commodity pattern of Hungary's foreign trade (2008)***

Commodity groups	Export	Import	Balance	Export	Import
	million EUR			% of total	
Total trade	**72,838**	**72,997**	**- 159**	**100.0**	**100.0**
Food, beverage	4,875	3,377	1,498	6.7	4.6
Raw materials	1,712	1,422	290	2.4	1.9
Energy	2,770	9,378	- 6,608	3.8	12.8
Manufactured products	19,391	23,074	- 3,683	26.6	31.6
Machinery, vehicles	44,090	35,746	8,344	60.5	49.0
EU-27	***56,927***	***49,649***	***7,278***	***100.0***	***100.0***
Food, beverage	3,943	3,097	846	6.9	6.2
Raw materials	1,508	978	530	2.6	2.0
Energy	1,747	2,043	- 296	3.1	4.1
Manufactured products	15,544	19,791	- 4,247	27.3	39.9
Machinery, vehicles	34,185	23,739	10,446	60.1	47.8
Extra-EU	***15,911***	***23,348***	***- 7,437***	***100.0***	***100.0***
Food, beverage	933	281	652	5.9	1.2
Raw materials	204	444	- 240	1.3	1.9
Energy	1,023	7,334	- 6,311	6.4	31.4
Manufactured products	3,847	3,283	564	24.2	14.1
Machinery, vehicles	9,905	12,006	- 2,101	62.3	51.4

Source: Hungarian Central Statistical Office (www.ksh.hu) and own calculations

ous mistakes when reforming agriculture after 1990. When compared to other new EU member countries (and also to some more established ones), Hungarian exports are structurally more advanced and contain the highest share of high-tech products regionally.

Direct Capital Exports

Overall figures. By the end of 2007, Hungary had the second highest capital export figure among the new EU members, with a stock of more than USD 18 billion (or EUR 13 billion, based on current exchange rates) *(Table 47)*. The figure for Poland was slightly higher (USD 19.6 billion), Hungary however had a stock threefold higher than that for Slovenia, 2.6 times higher than that for the Czech Republic and more than tenfold that of the stock registered by Slovakia. These figures are not only the product of several aspects of their respective economic policies, but more importantly the microeconomic maturity of their individual economies. It should be noted that capital export data is not complete, as it does not include small investment volumes. The majority of small Hungarian companies present abroad do not fall into the category of announcing capital exports. On the other hand, mirror statistics from some other countries seem to downgrade the importance of the presence of Hungarian capital (e.g. Romania).

Table 47. ***Outward (export) stock of foreign direct investment by selected countries (million USD, 2007)***

Capital exporting country	Outward stock	
	Total	Per capita
Greece	30,799	2,752.4
Poland	19,644	515.3
Hungary	**18,282**	**1,817.3**
Czech Republic	6,971	674.8
Slovenia	6,123	3,031.2
Ukraine	6,077	130.7
Croatia	3,495	787.2
Slovakia	1,609	298.0
Romania	917	42.6
Bulgaria	599	78.2

Source: UNCTAD, World Investment Report 2008 (www.unctad.org) and own calculations

Turning to capital imports, Hungary was a pioneer during the 1990s with respect to the amount of foreign capital attracted, the structure of foreign investments and the degree of economic and capital liberalisation. According to end of 2007 data, foreign direct capital stock in Hungary amounted to USD 97.4 billion, slightly

less than that of the Czech Republic (USD 101.1 billion), one third more than that of Romania (USD 60.9 billion) and almost 2.5 times that of Slovakia (USD 40.7 billion) *(Table 48)*.

Table 48. ***Inward (import) stock of foreign direct investment from selected countries (million USD, 2007)***

Capital importing country	Inward stock	
	Total	Per capita
Ireland	187,184	42,833.9
Denmark	146,632	26,855.7
Poland	142,110	3,728.0
Portugal	114,192	10,762.7
Czech Republic	101,074	9,784.5
Hungary	**97,397**	**9,681.6**
Finland	85,237	16,112.9
Romania	60,921	2,827.0
Greece	52,838	4,721.9
Croatia	44,630	10,051.8
Kazakhstan	43,381	2,854.0
Slovakia	40,702	7,537.4
Ukraine	38,059	818.5
Bulgaria	36,508	4,766.1
Slovenia	10,350	5,123.8

Source: UNCTAD, World Investment Report 2008 (www.unctad.org) and own calculations.

Geographic orientation of outward FDI. According to official data released by the National Bank of Hungary, total Hungarian capital stock abroad amounted to EUR 11.3 billion at the end of 2007, with a clear concentration in Europe (92%). Within Europe, neighbouring countries proved to be the main targets for Hungarian investment, the list for which is clearly led by Slovakia, with more than one quarter of total investment stock, and followed by Croatia, Bulgaria, Romania, Macedonia and Serbia *(Table 49)*. Three other European countries (United Kingdom, Netherlands and Switzerland) proved to be important destinations for Hungarian capital, not only for direct investment reasons but also with a view to further transfer of capital.

Sectoral composition of the stock of outward Hungarian FDI. More than half of Hungarian investments abroad are concentrated on the service sector. Real estate, economic services with its share of 28.3% lead the list, followed by oil- and energy-related investments (22.1%) *(Table 50)*. Moreover, major investments have been made in real estate, trade, mining, and some manufacturing industries. Based on the sectoral breakdown, and due to the small size of the Hungarian economy, it is not difficult to identify the major capital exporting companies. They include MOL (energy and oil), Hungarian Aluminium Co. (mining), OTP & MKB (banking and finance), Trigránit (construction and trade), Hungarhotels, Danubius, Hunguest Hotels (real estate and hotels), Magyar Telekom (telecommunications), Gedeon Richter (pharmaceuticals), Videoton (electronics), Dunapack (packaging), CBA (groceries) and several other rapidly expanding companies (e.g. Zalakerámia, Fornetti, etc.).

Table 49. ***Stock of Hungarian capital exports by main countries (2006, 2007)****

Country	Stock (million EUR)		% of total	
	2006	2007	2006	2007
Slovakia	2,537	2,796	27.5	24.8
United Kingdom	479	1,392	5.2	12.3
Croatia	970	1,055	10.5	9.3
Bulgaria	431	577	4.7	5.1
Netherlands	1,060	561	11.5	5.0
Romania	430	520	4.7	4.6
South Korea	..	496	..	4.4
Switzerland	510	482	5.5	4.3
Macedonia	405	475	4.4	4.2
Serbia	121	433	1.3	3.8
Cyprus	265	413	2.9	3.7
Ukraine	213	306	2.3	2.7
Montenegro	245	267	2.7	2.4
Poland	266	242	2.9	2.1
Russia	140	161	1.5	1.4
USA	..	126	..	1.1
Czech Republic	140	122	1.5	1.1
Italy	..	106	..	0.9
Total capital stock abroad	**9,224**	**11,293**	**100.0**	**100.0**

*Including countries with Hungarian capital export stock over EUR 100 million.
Source: National Bank of Hungary (www.mnb.hu).

Table 50. ***Hungary's outward capital stock by main sectors (2006, 2007)***

Sectors	Outward capital stock				Main Hungarian investors
	million EUR		%		
	2006	2007	2006	2007	
Agriculture, forestry	4	1	0.0	0.0	..
Mining	890	991	9.6	8.8	..
Manufacturing	2,983	3,413	32.3	30.2	..
– *oil, coal*	2,350	2,501	25.5	22.1	MOL
– *electrical machinery*	57	340	0.6	3.0	Videoton
– *chemicals*	250	249	2.7	2.2	..
– *non-ferrous metals*	114	175	1.2	1.6	..
Construction industry	22	39	0.2	0.3	Trigranit
Services	5,102	6,548	55.3	58.0	..
– *trade, repair*	875	1,053	9.5	9.3	Trigranit, CBA
– *hotels, gastronomy*	61	72	0.7	0.6	Hungarhotels
– *transportation, storage telecommunications*	227	241	2.5	2.1	..
– *financial services*	2,672	1,917	29.0	17.0	OTP, MKB
– *real estate, economic services*	1,246	3,192	13.5	28.3	Hungarhotels
Other sectors	301	223	2.7	2.6	..
Total FDI stock	**9,224**	**11,293**	**100.0**	**100.0**	**..**

Source: National Bank of Hungary (www.mnb.hu)

Tourism

Thanks to its favourable geographical endowments, a thousand years of history, colourful cultural traditions, celebrated cuisine and to the hospitality of its inhabitants, Hungary plays a key role in global and particularly in European tourism. During the last decade, due to growing competition within the tourism industry, Hungary lost its formerly prominent position in the international rankings (in 1996 Hungary held 6th place, while in 2007 it was just 22nd). However if the number of visits by foreigners is taken in the context of the country's territorial extension or population number, it can be stated that Hungary is still in the leading group. Significant experience in hospitality was already gained during the millenary exposition (1896) organised in Budapest, and attracting thousands of foreign visitors. During the period of the Austro-Hungarian Monarchy, holiday resorts and locations for excursions into the Carpathian Mountains were also very popular. The prestigious conferences organised in the Hungarian capital between the two world wars, and the city's reputation as a spa destination contributed to the international recognition of the Hungarian tourism industry. Between 1945 and 1990 the villages near Lake Balaton met the recreational needs of visitors from other Eastern Bloc countries, which along with plentiful domestic visits, served as the engine of growth for the Hungarian hotel and catering industry. Over the two decades since the change of regime, the importance and necessity of raising the country's competitiveness, and the enduring maintenance of the latter, was recognised by the leaders of the Hungarian tourism sector. This interest is reflected by the clearly defined and successful development strategy, recently instigated in the framework of the tourism industry. These days, beside its role as an economic contributor to GDP, tourism in Hungary also represent an intersectoral phenomenon, with an eminent part to play in the improvement of the quality of life.

The Role of Tourism in the Hungarian Economy

It is difficult to define the importance of tourism with precise indicators, however, it should be asserted that tourism is one of the 'pull' factors in the Hungarian economy. Analysing the productivity of tourism in terms of its multiplier effect, beyond merely hospitality and catering, it is to be stated that tourism contributes 8% to the national GDP. The number and size of enterprises directly related to tourism are increasing, and the number of employees working in the sector is stable. This means that 4% of all wage-earners in the Hungarian economy are employed in the tourism industry. Tourism has a key role in the current account balance of the Hungarian National Bank. Considering that the consumption rate of foreign visitors arriving in Hungary is higher than the expenditure of Hungarians travelling abroad (which in 2007 accounted for EUR 1.3 billion), the balance of the current account is positive (*Table 51*).

Table 51. ***Economic indicators related to tourism (2004–2007)***

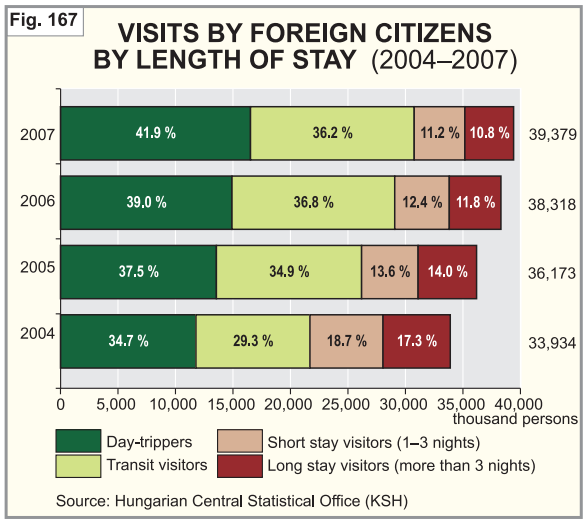
	2004	2005	2006	2007
Number of employees in tourism (thousand persons)	149	154	157	156
Indicators	Balance of current account (billion EUR)			
Tourist revenues	3,265	3,433	3,371	3,450
Tourist expenditure	2,302	2,347	1,687	2,149
The tourist balance	962	1,085	1,684	1,301

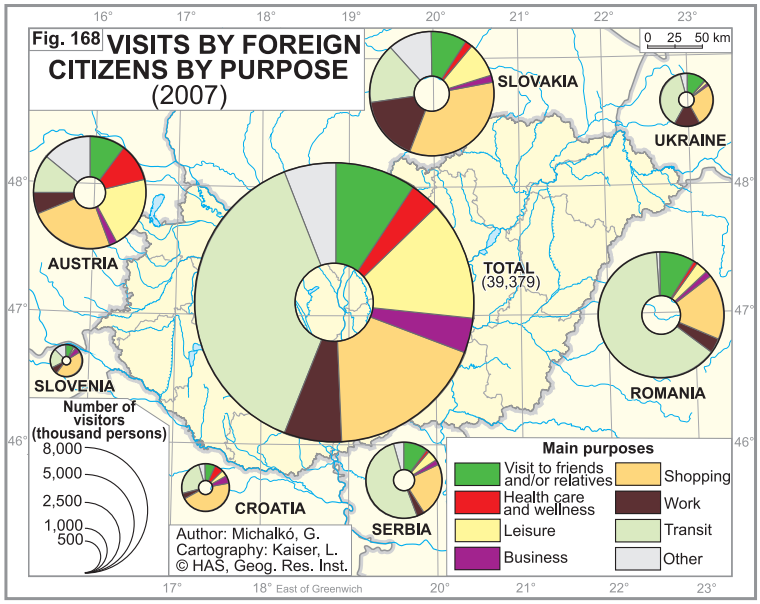
Source: Hungarian Central Statistical Office (www.ksh.hu)

Tourism is also considered to be an important issue by the Hungarian political body and its influence can be seen in the stimuli provided, and support given for investments within the sector, along with the funding of an effective marketing campaign. In the national budget tourism appears as a separate head of expenditure and this is used to achieve the objectives laid out by the National Tourism Development Strategy (2005–2013).

Foreign Visitors

Year on year, the annual rate of arrivals in Hungary significantly exceeds the total population figure of the country. During the period between 2004 and 2007, the number of international arrivals increased by 16%, and by 2007 it was around 40 million. These favourable figures indicate the intensity of international transit and excursion flow, rather than the demand generated by foreign tourists. The particular geographical position of Hungary contributes to the heavy ***transit traffic***. A considerable proportion of the flow of Turkish, Romanian and Serbian guest workers travel through Hungary, using the transport corridors leading from the Balkan peninsula towards West Europe. The movement of tourists heading from North European countries towards the Mediterranean region is also significant. In 2004–2007 the number of transit visitors arriving in the Hungarian Republic increased from 29.3% to 36.2% of all visitors (*Figure 167*). Beside transit visitors, there was also a high proportion of ***day-trippers***, especially in the settlements near to the national borders (in 2002 it was 41.9%). In the period 2005–2007, the ratio of overnight visitors decreased by 30%, and they accounted for 8.6 million tourists in 2007. On the one hand, the decreasing number of foreign tourists can be explained by the economic decline experienced in the most important source countries, especially in Germany, on the other hand, newly emerging tourist destinations are providing greater competition when trying to attract the attention of foreign tourists.





Analyses of the ***touristic intentions of foreign visitors*** to Hungary have led to the conclusion that, beyond the aforementioned transit traffic, the primary motivations for visiting in 2007 were: shopping (18.7%), visiting friends and relatives (VFR, 9.4%), work (6.7%), business (4.1%) and health tourism (3.5%) (*Figure 168*). Shopping is popular, thanks to the

wide range of goods, favourable prices, and excellent shopping environment, and as well as to the well-known Hungarian products such as salami, paprika, spirits and wine. In 2007, shopping represented a share of 45.4% in the expenditure of day-trippers. The high proportion of tourists coming to visit friends and relatives can be explained by the intense relationship between the sizeable Hungarian minority living in neighbouring countries, and friends and relatives that are resident in the mother country. The high share of work visits reflects the advantages offered by EU membership, the free movement of the workforce being a fundamental right.

The majority of visitors recorded crossing the Hungarian borders hailed from the ***neighbouring countries*** (71.8%). In 2007 the highest rates were represented by the citizens of Romania (20.3%), Slovakia (19.8%) and Austria (16.5%). The most intensive mobility towards Hungary among foreign visitors who are not from a neighbouring country was represented by German (7.8%) and Polish citizens (3.3%). With respect to the share of each nationality from neighbouring countries by purpose of their visit, it can be affirmed that a high number of people from Romania arrived with transit intentions (6.7%), many Ukrainian citizens were bound to visit relatives (11.3%), most people from Croatia came for shopping (44.4%), job opportunities attracted people from Slovakia (16.7%), business purposes had importance for Slovenians (5.8%), while in health tourism Austrian visitors had the highest share (10.8%).

Tourism Substructure and Attractions

Hungary has a ***modern, internationally competitive tourism substructure***. Access to the country is facilitated by the well-developed transport network including air, rail, water and road access; visitors usually prefer travelling by road.

The marketing of Hungarian tourist attractions is facilitated by the pre-existing infrastructure that has been developed with tourism in mind. The prime destination for Hungarian urban tourism is of course Budapest, where the historic atmosphere is blended with modernity. Beside the capital city, the six regional centres of Győr, Székesfehérvár, Pécs, Miskolc, Szeged and Debrecen have characteristics of a busy and colourful city, which can be attractive to tourists. Budapest and the regional centres have a leading economic position, moreover these cities are the privileged bastions of culture (with their museums and theatres), and science (universities and research institutions), therefore beside their key role in business and conference tourism they are well known destinations for cultural tourism. High quality hotels – which often belong to an international chain – offer much of the commercial accommodation to be found in these cities. Most of the country's 21 five-star hotels are to be found in Budapest: properties belonging to the leading hoteliers (InterContinental, Marriott, Hilton, Accor, Best Western, Four Seasons, Kempinski, Le Méridien and Radisson) are located in the Hungarian capital.

Health tourism is the leading touristic product in Hungary (*Figure 169*). Due to the country's favourable geological features, thermal waters (at a temperature of 60–70°C) and thermal baths rich in different mineral compositions constitute the natural endowments of this sector of tourism, to be found in many of the country's settlements, with the curative effects and healing power of the thermal waters differing by region. In Hungary there are 51 settlements labelled as 'health spas' (such as Gyula, Hévíz, Hajdúszoboszló, Debrecen, Sárvár, Bük and Zalakaros). The majority of them, due to the clearly defined development strategy and financial support of the government (in the framework of the Széchenyi Plan), are equipped with the water circulation and filtration equipment required under EU regulations. The spas offer high quality medicinal treatment for visitors that can choose among 56 spa, and 63 wellness hotels in 2007, together offering around 24 thousand hotel rooms.

The ***UNESCO World Heritage sites*** are the principal destinations for ***cultural tourism*** in Hungary. Four of the eight World Heritage sites

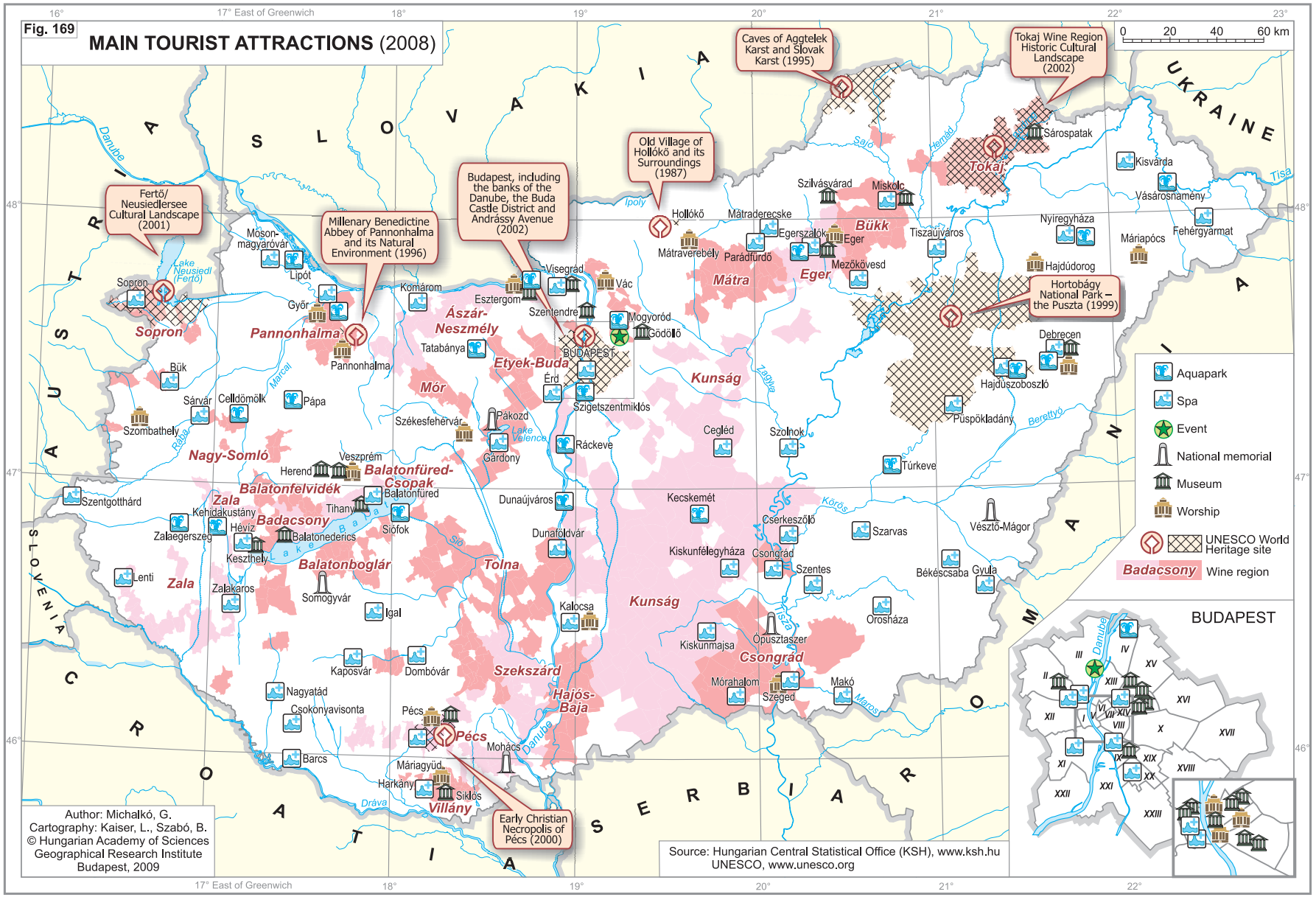


Fig. 169
MAIN TOURIST ATTRACTIONS (2008)
Caves of Aggtelek Karst and Slovak Karst (1995)
Tokaj Wine Region Historic Cultural Landscape (2002)
Old Village of Hollókő and its Surroundings (1987)
Budapest, including the banks of the Danube, the Buda Castle District and Andrássy Avenue (2002)
Millenary Benedictine Abbey of Pannonhalma and its Natural Environment (1996)
Fertő/ Neusiedlersee Cultural Landscape (2001)
Hortobágy National Park – the Puszta (1999)
Early Christian Necropolis of Pécs (2000)
Sopron
Pannonhalma
Ászár-Neszmély
Etyek-Buda
Mór
Nagy-Somló
Balatonfelvidék
Balatonfüred-Csopak
Zala
Badacsony
Balatonboglár
Tolna
Kunság
Szekszárd
Hajós-Baja
Csongrád
Bükk
Eger
Mátra
Tokaj
Aquapark
Spa
Event
National memorial
Museum
Worship
UNESCO World Heritage site
Badacsony Wine region
BUDAPEST
Author: Michalkó, G.
Cartography: Kaiser, L., Szabó, B.
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Geographical Research Institute
Budapest, 2009
Source: Hungarian Central Statistical Office (KSH), www.ksh.hu
UNESCO, www.unesco.org

are to be found within the administrative borders of settlements (Budapest, Hollókő, Pannonhalma and Pécs), whereas another four sites are spread across several settlements or communes: Caves of Aggtelek Karst and Slovak Karst (22 settlements); Hortobágy National Park–The Puszta (20 settlements); Fertő-Neusiedlersee Cultural Landscape (10 settlements); and Tokaj Wine Region Historic Cultural Landscape (27 settlements). The ***cultural and sporting calendar*** (Budapest Spring Festival, Formula One Hungarian Grand Prix), and other events targeted at the youth market (Sziget Festival), benefit from more than a decade of tradition and are some of the foremost attractions of Hungarian tourism.

Some of the countryside attractions in Hungary are represented by the ***national parks*** and ***wine-growing regions***. The former locations meet the demands of ***ecotourism***, whereas wine regions offer a popular destination for those who are keen on ***gastrotourism*** in general, and viticulture in particular. One of the special features of the Hungarian national parks is that two of the ten protected natural sites – the Caves of Aggtelek Karst and Slovak Karst; and Fertő-Neusiedlersee Cultural Landscape – additionally feature as World Heritage sites and are cross-border (shared with with Slovakia and Austria). Tourists who visit at least one of the cellars of the 22 Hungarian wine regions will experience the heritage of an internationally competitive Hungarian wine industry, and can sample its outstanding products.

Tourist Flow

In the period between 2004 and 2007, the registered number of arrivals increased by 6.5% in hotels, boarding houses, campsites, tourist hostels, youth hostels and bungalows. This rate can be explained by the ***increase in domestic turnover***, along with the stability reflected by international tourist demand. The growing domestic demand stems from the availability of additional disposable income, the introduction of the holiday voucher system and from a sheer home-grown interest in rediscovering the country's touristic attractions. The ***most visited location*** in Hungary is ***Budapest***, in the region of Central Hungary. In 2007 its share of the total tourist flow was 31%, and it is even higher (52.4%) when considering international visitors (*Figure 170*). The counties in West Transdanubia registered a significant influx of tourists (42.6%), mostly thanks to ***Lake Balaton***, the largest lake in Central Europe offering fine opportunities for bathing and relaxation. With a particularly high ratio of international demand (34.5%), these regions surpassed those situated east of the Danube (11.3% for international visitors), which otherwise only had a 23.4% share of the total tourist flow. Accommodation establishments in ***West Transdanubia*** registered one of the highest numbers of tourist arrivals, second only to Budapest. The popularity of the region among both domestic and international visitors is also contributed to by the numerous high quality spas (Bük, Hévíz, Sárvár, Zalakaros, etc.) and by its geographical proximity to the most important source countries (Germany and Austria).

The number of ***visitor nights*** spent in accommodation establishments dramatically dropped during the period between 2004 and 2007 (-23.8%). ***Germany*** still ranks first among the source countries; its share from the total tourist flow is 25.8% (*Table 52*). Similarly, Hungary is extremely popular among ***Austrians*** (7.0%), the ***British*** (6.1%) and ***Italians*** (4.9%), along with former Eastern Bloc citizens such as Romanians (3.5%) and Poles (3.1%). Citizens arriving from the European Union member states are highly represented (71.1%), and there is a considerable ratio of overseas tourists arriving from the USA (5.3%), Japan (2.1%) and Israel (1.6).

The ***purchase of real estate***, with the possible establishment of a second home ***by foreign citizens*** in Hungary, has been one of the most important phenomena of tourism during the period since the regime change. In the period between 2001 and 2006, around 36 thousand foreign citizens purchased real estate in Hungary (*Figure 171*). The foreign owners are concentrat-

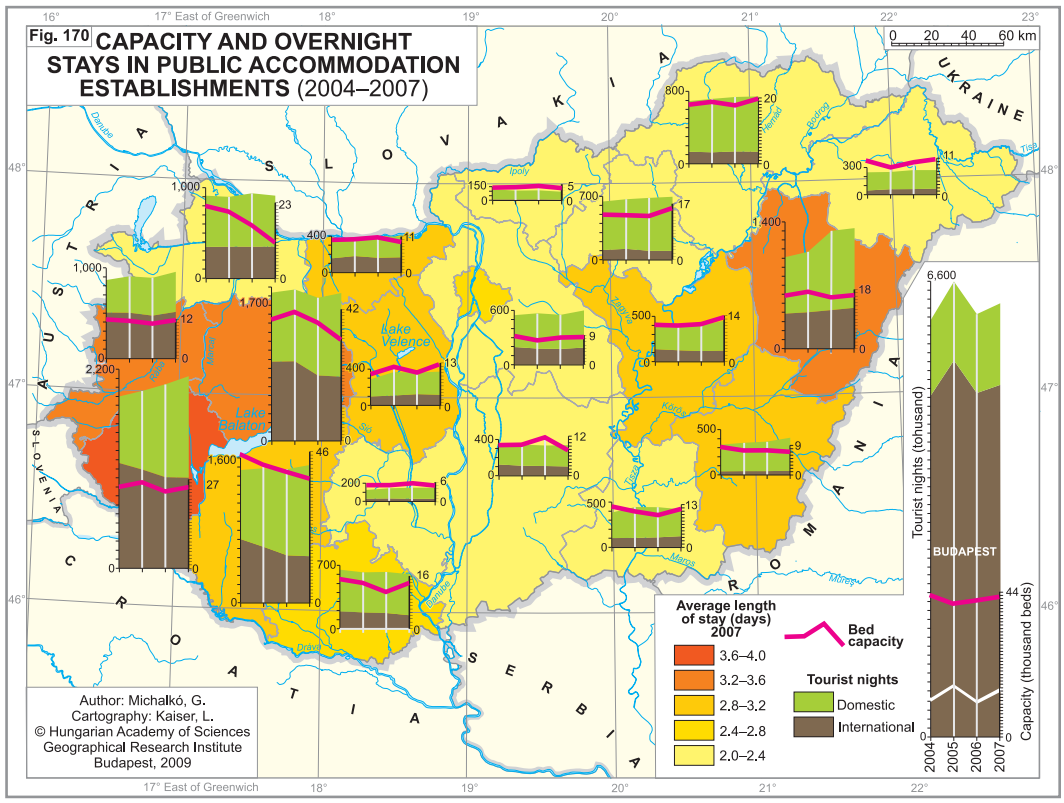
Fig. 170
CAPACITY AND OVERNIGHT STAYS IN PUBLIC ACCOMMODATION ESTABLISHMENTS (2004–2007)
0 20 40 60 km
Lake Velence
Lake Balaton
Average length of stay (days) 2007
3.6–4.0
3.2–3.6
2.8–3.2
2.4–2.8
2.0–2.4
Bed capacity
Tourist nights
Domestic
International
BUDAPEST
Tourist nights (tohusand)
Capacity (thousand beds)
2004
2005
2006
2007
Author: Michalkó, G.
Cartography: Kaiser, L.
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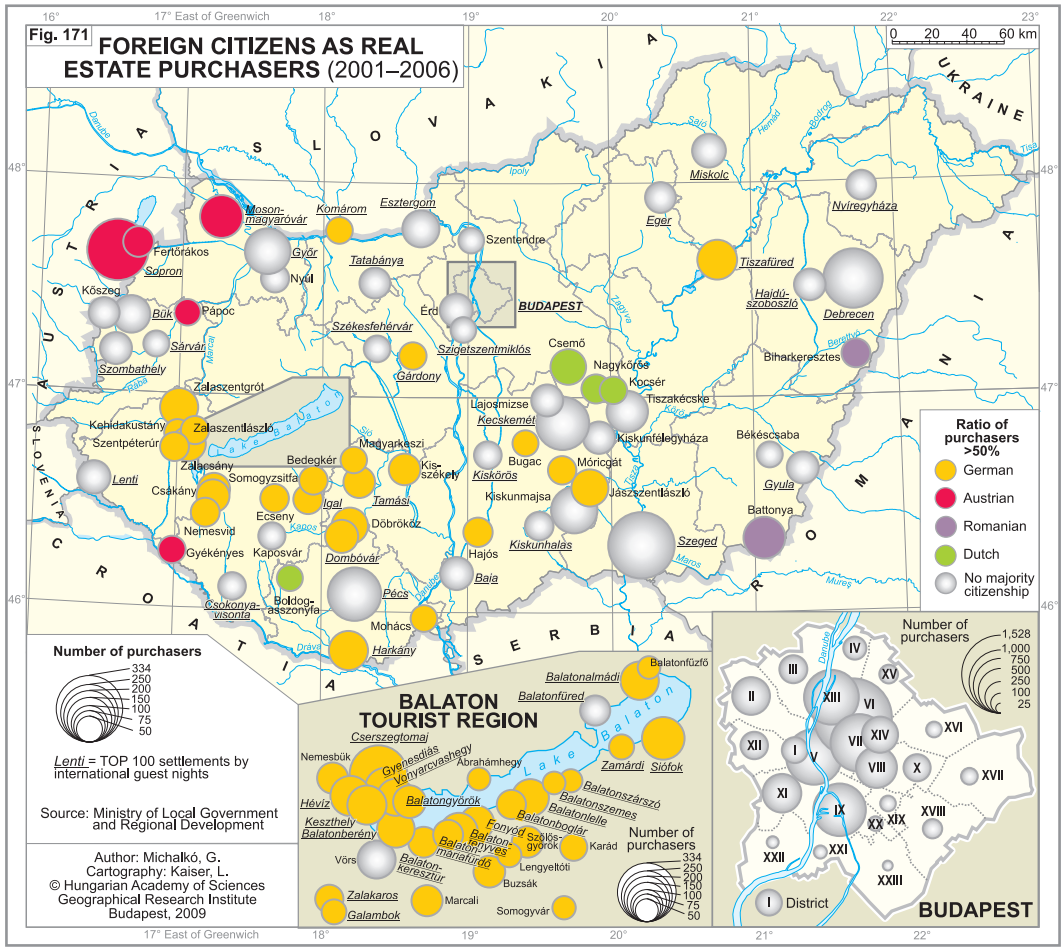
Fig. 171
FOREIGN CITIZENS AS REAL ESTATE PURCHASERS (2001–2006)
0 20 40 60 km
Ratio of purchasers >50%
German
Austrian
Romanian
Dutch
No majority citizenship
Number of purchasers
334
250
200
150
100
75
50
Lenti = TOP 100 settlements by international guest nights
Source: Ministry of Local Government and Regional Development
BALATON TOURIST REGION
Balaton
Lake
Number of purchasers
1,528
1,000
750
500
250
100
25
District
BUDAPEST
Author: Michalkó, G.
Cartography: Kaiser, L.
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Table 52. ***Leading countries rate in public accommodation establishments (1990, 2007)***

	Tourist nights				Foreign visitors	
	thousand		%		%	
	1990	2007	1990	2007	1990	2007
Total	**13,618**	**10,171**	**100.0**	**100.0**	**100.0**	**100.0**
of which EU countries	-	7,231	-	71.1	-	81.2
Germany	5,186	2,621	38.1	25.8	7.0	7.5
Austria	988	711	7.3	7.0	13.7	15.8
United Kingdom	223	620	1.6	6.1	0.3	0.8
USA	435	534	3.2	5.3	0.6	0.9
Italy	672	499	4.9	4.9	1.0	1.6
Spain	-	394	-	3.9	0.1	0.4
Romania	193	353	1.4	3.5	24.0	20.8
France	221	346	1.6	3.4	0.4	0.8
Netherlands	977	343	7.2	3.4	0.4	0.8
Poland	861	313	6.3	3.1	10.1	3.6

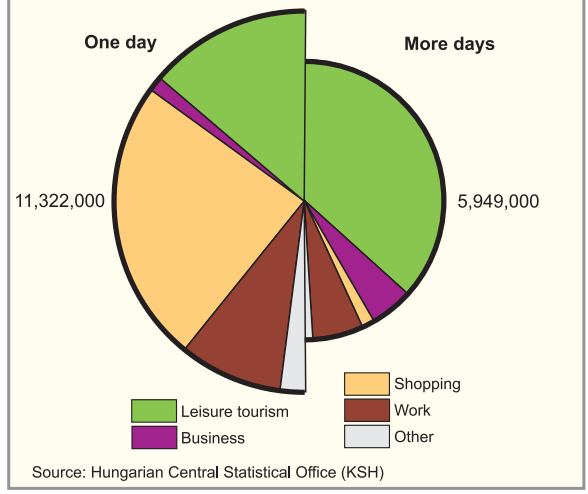
Source: Hungarian Central Statistical Office (www.ksh.hu

ed in the most popular regions of the country, around ***Lake Balaton*** (29%) and in ***Budapest*** (21%). In the studied period, ***German*** (33.1%), ***Austrian*** (14.7%), ***Romanian*** (9.6%), ***Dutch*** (8.6%), Irish (6.3%) and British (4.1%) citizens had the highest share (total 76.4%) among the private investors buying real estate in Hungary. Distinct preferences could be identified by nationality: Germans prefer the surroundings of Lake Balaton, Austrians tend to choose settlements near to the western border, the British and Irish give preference to Budapest, the Dutch are keen on buying properties in rural settlements and farms, whereas Romanians purchase properties in villages near the eastern border.

Hungarians Travelling Abroad

One of the key responsibilities of the Hungarian tourism sector is to ensure the provision of a high standard of services that serve the requirements of Hungarian citizens who travel abroad. Although between 2004 and 2007 the number of multi-day visits abroad by Hungarian citizens was decreasing year on year (-19.5% in total), the number of ***day-trippers*** increased (119.7%). In 2007 around twice as many Hungarians travelled abroad for one day (11.3 million) as those did with the intention of staying some days (5.9 million) (*Figure 172*). When analysed by travel purpose, visits abroad for ***shopping*** were characteristic of the one-day trips (47.3%), which were accomplished mostly in the border regions of ***Austria*** (37.7%) and ***Slovakia*** (34.6%), while ***multi-day trips*** were overwhelmingly for the purpose of ***holidaying*** (73.3%). As far as the latter is concerned, ***Croatia, Italy, Austria, Greece*** and ***Romania*** are the most popular destinations among Hungarian citizens.

Fig. 172 HUNGARIANS TRAVELLING ABROAD BY PURPOSE AND LENGTH OF STAY (2007)



Source: Hungarian Central Statistical Office (KSH)

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'Hungary in Maps' is the latest volume in a series of atlases published by the Geographical Research Institute of the Hungarian Academy of Sciences. A unique publication, it combines the best features of the books and atlases that have been published in Hungary during the last decades. This work provides a clear, masterly and comprehensive overview of present-day Hungary by a distinguished team of contributors, presenting the results of research in the fields of geography, demography, economics, history, geophysics, geology, hydrology, meteorology, pedology and other earth sciences. The 172 lavish, full-colour maps and diagrams, along with 52 tables are complemented by clear, authoritative explanatory notes, revealing a fresh perspective on the anatomy of modern day Hungary. Although the emphasis is largely placed on contemporary Hungary, important sections are devoted to the historical development of the natural and human environment as well.

In its concentration and focus, this atlas was intended to act as Hungary's 'business card', as the country's résumé, to serve as an information resource for the sophisticated general reader and to inform the international scientific community about the foremost challenges facing Hungary today, both in a European context and on a global scale. Examples of such intriguing topics are: stability and change in the ethnic and state territory, natural hazards, earthquakes, urgent flood control and water management tasks, land degradation, the state of nature conservation, international environmental conflicts, the general population decline, ageing, the increase in unemployment, the Roma population at home and the situation of Hungarian minorities abroad, new trends in urban development, controversial economic and social consequences as a result of the transition to a market economy, privatisation, the massive influx of foreign direct investment, perspectives on the exploitation of mineral resources, problems in the energy supply and electricity generation, increasing spatial concentration focused on Budapest in the field of services (e.g. in banking, retail, transport and telecommunications networks), and finally the shaping of an internationally competitive tourism industry, thus making Hungary more attractive to visit.

This project serves as a preliminary study for the new, 3rd edition of the National Atlas of Hungary, that is to be co-ordinated by the Geographical Research Institute of the Hungarian Academy of Sciences.

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