Ukraine in Maps

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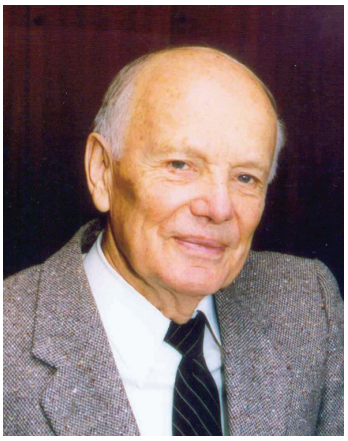
FOREWORD



This book was written to draw the reader's attention to a young sovereign state that appeared on the world's political stage more than sixteen years ago. The Ukraine Proclamation of Independence was drafted on August 24th 1991 and endorsed by a nationwide referendum on December 1st of that same year. The Proclamation signified the realization of a patriotic endeavour of numerous generations of Ukrainians to gain sovereignty of their homeland and establish its rightful place in European history. Ukraine is an ancient country with cultural and state traditions reaching back to the end of the first millennium. Ukraine, a successor of Kievan Rus', the first Slavic state, gained national statehood twice in the course of its history in bitter struggles: once in the 17th century and again in early 20th century. Currently, Ukraine has followed the track of democratic statehood consolidation, which includes vigorous economic changes, development of institutions and integration into European and global political and economic structures.

On the world map, Ukraine is a land of vast extension within the Central Eastern European region, exceeding (603.7 thousand km^2) such countries as France, Spain, Sweden, Germany and Poland by area. Additionally, it is the fifth largest continental European country by population (46.6 million on January 1st, 2007). The natural-climatic conditions show amazing diversity: Ukraine abounds in fertile plains (steppes), picturesque mountains, forests and rivers and is extremely rich in mineral resources. This is a land of blue skies and wide open spaces of golden wheat fields that have become national symbols, i.e. colours of the national banner. A genuine treasure of Ukraine is its several hundred kilometre long seaside of sunny beaches and resorts.

Present-day Ukraine is a country of cities, large industrial, academic and cultural centres such as Kyiv (Kiev), Kharkiv, Dnipropetrovs'k, Donets'k, Odesa, L'viv. Ukraine's economic map represents its uniformity and regional features of the national economy, including a highly diversified industrial sector: extracting industries, iron

Ukraine, the second-largest European country, has a strategic geographical position at the crossroads between Europe and Asia. It is a key country for the transit of energy resources from Russia to the European Union, which is one reason why Ukraine has become a priority partner in the neighborhood policy of the EU. Besides its efforts to maintain correct stable and close relationships with Russia, Ukraine has recently made resolute steps toward European integration, accession to the EU and NATO. In the framework of the European Neighbourhood and Partnership Instrument, Ukraine has entered into several agreements, and in recent years, more than two thirds of its foreign trade turnover has transacted with the EU. Ukraine has also actively participated in peacekeeping and conflict management missions of the Union.

The relationship between Ukraine and Hungary has been cordial not only for the aforementioned reasons, but also because of the links between these states, which stretch back over a thousand year history and which have been peaceful compared with those between Poland and Ukraine or between Russia and Ukraine. These state relations basically started with the marriage of Hungarian king Andrew I to the Ukrainian princess Anastasia, daughter of the ruler of the Kievan Rus, Yaroslav the Wise (1038). These dynastic relations continued between Hungary and the Ukrainian principalities of Galych and Volhynia until the 14th century, when the Polish-Lithuanian incorporation of the Ukrainian lands occurred. Ethnic coexistence between the Hungarians and Ukrainians in the northeastern Carpathians date back to the 13th century. This Ukrainian population has proven to be a most reliable supporter among the ethnic minorities of Hungarian aspirations to independence in the 18–19th centuries. The venue of Hungarian–Ukrainian coexistence, Transcarpathia, was ceded to Czechoslovakia in 1919, after 1023 years in the Kingdom of Hungary; after an interruption of Hungarian authority between 1939-1944 – it became part of Soviet Ukraine, in 1945. Even

and steel smelting and non-ferrous metallurgy, heavy and transport engineering, manufacturing of precision instruments, sea-going and river vessels, construction of aircraft and rockets, nuclear energy. Favourable geographic settings and developed railway, public road, air, marine and pipeline communication networks have enabled Ukraine to successfully develop economic cooperation with local and distant countries to recognize its potential as a transit country.

Located on the crossroads of migration routes and in the zone of interference between global civilisations, Ukraine has played a role in connecting the Catholic and Protestant European West with the Eastern Orthodox and Muslim East. This gateway function helps to uniquely position the country. The historical-cultural atlas of Ukraine demonstrates a history of several thousand years along with the heritage of ancient Trypillian, Scythian and Antic periods, the principalities and Cossack epochs and explains the ethnographic diversity, multiethnic and multicultural character of the present-day population. Ancient cities and towns, museums and historical sites with a wealth of relics celebrate the memory of battles fought with foreign invaders, outstanding Ukrainian personalities – thinkers and masters of the Ukrainian language Hrihoryi Skovoroda and Taras Shevchenko, Ivan Franko and Lesia Ukrainka; musicians and artists like Mykola Lisenko and Serhiy Vasil'kovskyi; representatives of the national theatre and cinema – Maria Zan'kovetskaya, Lesia Kurbas and Oliksandr Dovzhenko, Serhiy Paradzhanov; and scholars like Vladimir Vernadskyi, Ilia Mechnikov, Mikhail Hrushevskyi, Serhiy Korolev.

Ukraine is a hospitable and peace-loving country. It is the only power in the world that has voluntarily renounced its nuclear arsenal. In a complex and controversial world, Ukraine builds collaboration with other countries upon the principles of mutual understanding and confidence and establishes initiatives aimed at the creation of a system that grants international security.

This book is intended to familiarize the audience with the uniqueness and natural diversity of Ukraine, characteristic features of its regions, conditions for economic and cultural development and creative activities of its people. The publication, ***Ukraine on Maps,*** is the result of joint efforts of Ukraine and Hungarian geographers. I hope it will inspire many readers to seek a deeper understanding of the development of Ukraine and its regions.

Boris E. Paton
President of National Academy of Sciences
of Ukraine, Academician

though conflicts arose between the Ukrainians and Hungarians between 1918 and 1945 it should be emphasized that their coexistence could be labeled as peaceful, relative to that with the other neighboring people. This is one of the reasons why Hungary was second to Poland to conclude a Basic Treaty with Ukraine (1993) just after Ukraine obtained its independence. This treaty enacted the invulnerability of the existing state boundaries.

Today, Ukraine and its two western neighbors, Poland and Hungary (both EU members), consider each other to be strategic partners of foremost importance. Apart from the centuries-old historical links, it is the geographical location and current economic interests of these countries that are preeminent. The new EU members receive energy sources through the pipelines leading from the Russian oil and gas fields to Europe via Ukraine; whereas Ukraine has gained access to the core areas of the EU in Germany and Italy i.e. its prominent trade partners via the highways in Poland and Hungary.

Since the disintegration of the USSR, the western world has had an ever-growing interest in the Ukraine, its people and its economy. As a result, a large number of publications have appeared on this country in different languages. Nevertheless, their quality and information content have lagged behind those compiled in Ukraine, especially maps and atlases. This recognition had prompted the collectives of the Institute of Geography of the National Academy of Sciences of Ukraine (Kyiv) and the Geographical Research Institute of the Hungarian Academy of Sciences (Budapest) to initiate cooperation, and the volume entitled "***Ukraine in Maps***" is a result of their joint effort. The book is basically intended to make the results of investigations conducted by Ukrainian geographers available to the English-speaking public, through Hungarian contribution. The atlas follows the traditions of the Geographical Research Institute of the Hungarian Academy of Sciences (similar to the publication of *South Eastern Europe in Maps* 2005, 2007) – it includes 50 maps, dozens of figures and tables accompanied by an explanatory text written in a popular scientific manner. The book is an attempt to outline the geographical setting and geopolitical context of Ukraine, as well as its history, natural environment, population, settlements and economy. The authors greatly hope that this joint venture will bring Ukraine closer to the reader and make this neighbor country of the EU more familiar, and consequently, more attractive.

E. Sylvester Vizi
President of Hungarian Academy of Sciences
Academician

UKRAINE IN EUROPE
(Geographical location and geopolitical situation)

Geographical setting

Ukraine is predominantly located in the southern part of eastern Europe between 44 and 52º of northern latitude and 22 and 40º of eastern longitude (*Figure 1*). Its territory spans 1,316 km from the west to the east and 893 km from the north to the south. Geographical extremes are the town of Chop (Transcarpathia) in the west and the village of Chervona Zirka (Luhans'k oblast) in the east; the village of Hremiach (Chernihiv oblast) in the north and the headland of Sarich in Crimea in the south. From the south the coasts are lapped by the waters of the Black Sea and the Sea of Azov.

The Ukrainian state is located on the interface of large physica-geographical units, such as the East European Plain and the Eurasian Mountain Range (partly comprised of the Carpathians and partly the Crimean Mountains). Plains constitute the overwhelming majority of Ukraine's territory (95%). With the exception of the aforementioned mountains, the topography provides adequate opportunity for agriculture, industry and residential housing, as well as for the development of infrastructure, including the transport network. There are a variety of natural zones within the portion of the East European

Plain that falls within Ukrainian territory, namely, mixed forests, broad-leaved forests, forest steppe and steppe. They differ in geomorphological and climatic conditions, the characteristics of water regime and soil cover, as well as the internal structure of landscape complexes.

State territory

A largely independent state named Ukraine first appeared on the map of Europe in 1918 when, in concluding the Peace Treaty of Brest-Litovsk (March 3, 1918), Soviet Russia was bound (amongst others) to recognise the Ukrainian People's Republic, with an area of 553,000 km². Previously, Kievan Rus' (in 1000 about 1,500,000 km²) and the Cossack State of Bohdan Khmel'nyts'kyi (in 1654 about 282,000 km²) could be considered the predecessors of modern Ukrainian statehood.

The Peace of Riga (March 18, 1921), bringing to a close the Polish-Ukrainian/Soviet hostilities following the First World War, awarded western Ukrainian (Galician and Volhynian) territories to Poland. It was largely due to this that the territory of the Ukrainian Soviet Socialist Republic (formed in 1922 as a constituent republic of the Soviet Union) extended over 451,600 km² between 1922 and 1938. As a result of WWII, in 1939 and 1940 Soviet Ukraine received 92,568 km² from the previous territory of Poland and 25,832 km² from Romania. At the same time, in 1940 Ukraine submitted the territory of the present-day separatist Dniestr Republic (2,500 km²) to the enlarged Moldavian Soviet Socialist Republic (established on August 2, 1940). Due to the annexation of Transcarpathia (from Czechoslovakia) and to the transfer of 2,848 km² to Poland in 1945, the territory of Soviet Ukraine increased from 567,500 km² to 577,500 km² between late 1940 and the end of 1945. This territorial data was slightly modified in 1951 as a result of a Polish–Soviet exchange of minor border areas near the San and Buh rivers (577,600 km²). The present-day territory of Ukraine (603,700 km²) was established with the transfer of Crimea from the Russian Soviet Federative Socialist Republic to the Ukrainian Soviet Socialist Republic in 1954 (on the 300th anniversary of the union of the Cossack State of Khmel'nyts'kyi with Russia).

Ethnic territory of Ukrainians

The present-day boundaries of Ukraine do not coincide everywhere with the ethnic territories of Ukrainians. In certain border areas, Ukrainians live side-by-side with Russians (e.g. Crimea, Donets'k, Luhans'k, Kharkiv, Odesa oblasts), Moldovans, Romanians (Chernivtsi, Odesa oblasts) and Hungarians (Transcarpathia). At the same time, Ukrainian ethnic areas can be found in some border regions of neighbouring states (e.g. the Prypiat' region in Belarus, the Don area and Kuban region in Russia, the Maramures area in Romania, and northeastern Slovakia).

The historical core of the Ukrainian ethnic territories are the regions west of the line of Chernihiv – Kyiv – Vinnytsia – Chernivtsi, which represents the major part of the original homeland of all Slavic people. Due to the colonisation of the sparsely populated or uninhabited steppe areas, the eastern zone of the Ukrainian ethnic territory moved up to the line of Poltava – Zaporizhzhia – Uman' during the 16th and 17th centuries, and extended further, in the 18th century up to the line of Rossosh – Donets'k – Kherson. The most recently populated parts of the present-day Ukrainian ethnic area are the coastal lowland of the Black Sea and Crimea, where Ukrainians settled during the 19th and 20th centuries.

Boundaries

Present state borders of the country had been formed during the time of the Soviet Union's existence, into which Ukraine was incorporated. According to principles of international law, former administrative borders of the USSR (after its dissolution in 1991) were inherited by Ukraine as one of the legal successors, thus they had turned into state boundaries.

The current boundary with Russia was formed in the period between 1925 and 1928; the eastern border section with Belarus in 1920. The western Ukrainian borders were drawn almost exclusively in the years preceding and following the Second World War (as the neighbouring states are currently named: with Poland in 1939 and 1945, Slovakia and Hungary in 1945, Romania in 1940 and 1945, and with Moldova in 1940). The Ukrainian borders of 1945 were modified by a minor Polish–Soviet territorial exchange in 1951 and by the transfer of Crimea from the Russian S.F.S.R. to the Ukrainian S.S.R. in 1954. Thanks to basic treaties with neighbouring states (e.g. Poland (1992), Hungary (1993), Russia, Belarus, Romania (1997) Ukraine has experienced hardly any border disputes following the break-up of the USSR – with the exception of Romania over Zmiinyi (Snake) Island in the Black Sea, and with Russia over Tuzla Island in the Kerch Strait.

Currently, land boundaries total 5,684 km in length (according to neighbouring states this is disputed and alleged to be 5,619 km – disputed figures in brackets []) in the following quantities (in km) broken down by country: Russian Federation – 1,955 [2,292], Belarus – 1,084 [975], Poland – 542 [529], Slovakia – 98 [98.5], Hungary – 135 [137], Romania – 608 [649.4], Moldova – 1,202 [939]. Of the 2,782 km long Ukrainian coastline, maritime borders make up 1,959 km (Black Sea – 1,559 km, Sea of Azov – 400 km). Ukraine asserts a maritime claim on its territorial sea extending 12 nautical miles (about 22 km) from the coast, and an exclusive economic zone extending 200 nautical miles (about 270 km).

Administrative divisions

According to its constitution Ukraine is an unitary state, the territory of which is subdivided into 24 regions (oblasts), one autonomous republic (Crimea) and two cities (municipalities) of special status, the Ukrainian capital Kyiv and the important Crimean naval base, Sevastopol' inhabited overwhelmingly by Russians (*Figure 2*). In the 20th century the first subnational administrative–territorial units were called "hubernia" (province) until 1923, from 1923 until 1932 as "okrug" (county) and since February 27, 1932 as "oblast" (region). Between their emergence and 1954, the number of oblasts increased from 5 (Kyiv, Dnipropetrovs'k, Kharkiv, Odesa, Vinnytsia) to 26 as a result of administrative reforms and an increase in state territory. Currently there are 24 oblasts which is the result of the incorporation of Drohobych into L'viv in 1959 and the changing administrative status of Crimea from oblast to an autonomous republic in 1992.

Oblasts are subdivided into a total of 490 raions (districts); 177 cities with oblast status and 279 towns of raion status. Until 1923, raions were termed "povit" (county). Their number decreased due to administrative reforms, from 706 (1923) to 600 (1986) and then to 490 (2007).

Fig. 2

ADMINISTRATIVE DIVISIONS

SETTLEMENTS

Population number

- over 1,000,000
- 500,000–1,000,000
- 100,000–500,000
- 50,000–100,000
- 10,000–50,000
- under 10,000

Types

KYIV / **SEVASTOPOL'** — Cities of special status

L'VIV / SIMFEROPOL' — Cities of regional (oblast) subordination and those subordinated to the Autonomous Republic of Crimea

Rakhiv — Towns of district (raion) subordination

Administrative status

KYIV — State capital

SIMFEROPOL' / L'VIV — Seat of the Autonomous Republic of Crimea and regional (oblast) centres

BOUNDARIES

- State border
- Boundary of the Autonomous Republic of Crimea, regions, Kyiv and Sevastopol' city councils, administrative units of the neighbouring states
- Boundary of districts (raions) and areas under town council subordination
- Territories under town council subordination

TRANSPORT NETWORK

Railways

- Trunk line
- Other

Roads

- Arterial
- Regional

Note: *Symbols of district (raion) centres are set off in rose.*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A ARTEMIVS'K
Al Almazna
Ar Artemove
Ark Artemivs'k
AV AVDIIVKA
B BRIANKA
Bi Bilozers'ke
By Bilyts'ke
DE DEBALTS'EVE
DY DYMYTROV
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KI KIROVS'KE
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MA MAKIIVKA
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NH NOVOHRODIVKA
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Pek Pereval's'k
PM PERVOMAIS'K
Po Popasna
Ro Rodyns'ke
SH SHAKHTARS'K
SN SNIZHNE
ST STAKHANOV
Sv Svitlodars'k
T Teplohirs'k
To TOREZ
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DRUZHBA
NOVHOROD-SIVERS'KYI
HORODNIA
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KHARKIV
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STANYCHNO-LUHANS'KE
SHPOLA
KAMIANKA
SVITLOVODS'K
ONUFRIIVKA
LOZOVA
SIVERS'K
SOLEDAR
KIROVS'K
LUHANS'K
DNIPRODZERZHYNS'K RESERVOIR
NOVOMYRHOROD
ZNAMIANKA
VERKHN'ODNIPROVS'K
NOVOMOSKOVS'K
PIDHORODNE
KRAMATORS'K
DRUZHKIVKA
ALCHEVS'K
SUKHODIL'S'K
OLEKSANDRIIA
TERNIVKA
KOSTIANTYNIVKA
DOBROPILLIA
KRASNODON
MALA VYSKA
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DNIPRO
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ANTRATSYT
CHERVONOPARTYZANS'K
KIROVOHRAD
PIATYKHATKY
ZHOVTI VODY
SYNEL'NYKOVE
SELYDOVE
ROVENY'KY
SVERDLOVS'K
NOVOUKRAINKA
POMICHNA
DOLYNS'KA
MARINKA
DONETS'K
MOSPYNE
AMVROSIIVKA
BOBRYNETS'
KRYVYI RIH
ZAPORIZHZHIA
KURAKHOVE
ILOVAIS'K
DOKUCHAIEVS'K
KOMSOMOL'SKE
YUZHNOUKRAINS'K
ORDZHONIKIDZE
MARHANETS'
VUHLEDAR
HULIAIPOLE
VOLNOVAKHA
ROSTOV-NA-DONU
VOZNESENS'K
APOSTOLOVE
NIKOPOL'
ORIKHIV
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KAMIANKA DNIPROVS'KA
ENERHODAR
VASYLIVKA
DNIPRORUDNE
TOKMAK
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BASHTANKA
NOVA ODESA
MOLOCHANS'K
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KAKHOVKA
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32° 33° 34° 35° 36° 37° 38° 39°
44° 45° 46° 47° 48° 49°

Ukraine's place in the European pattern of economic development

After 1989, the change in political, economic and social systems in the eastern part of Europe, the disintegration of socialist federal states (USSR, Yugoslavia, Czechoslovakia) along with territorial, ethnic and religious conflicts significantly disturbed the economies of the post-communist countries.

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, the introduction (or the absence) of shock therapy, the bottom in time and extent shifted from west to east and aggravated, the annual GDP had shrunk (in

Fig. 3

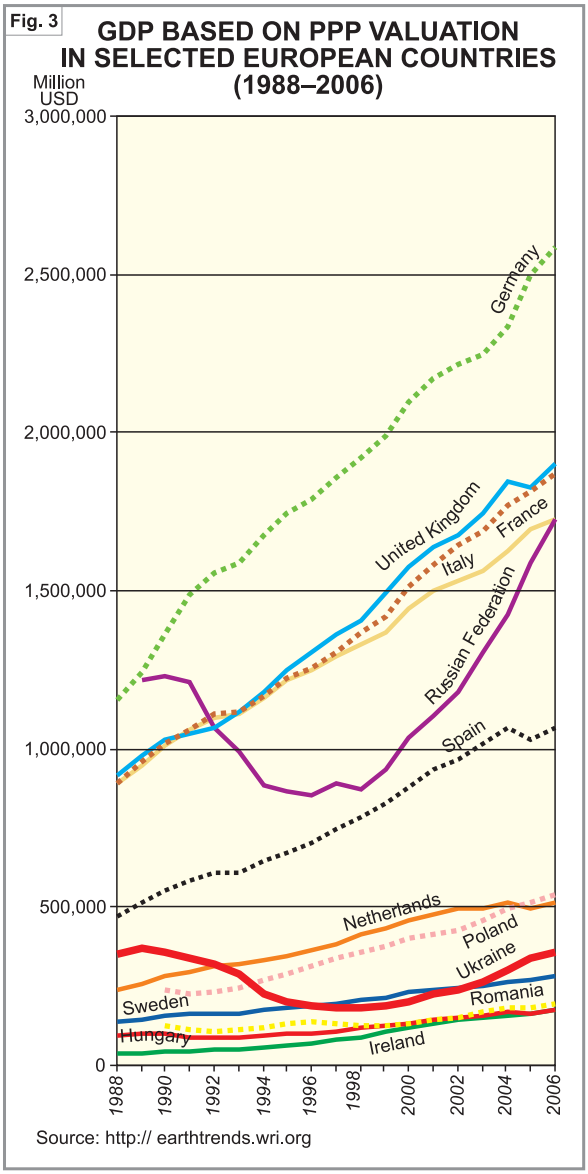
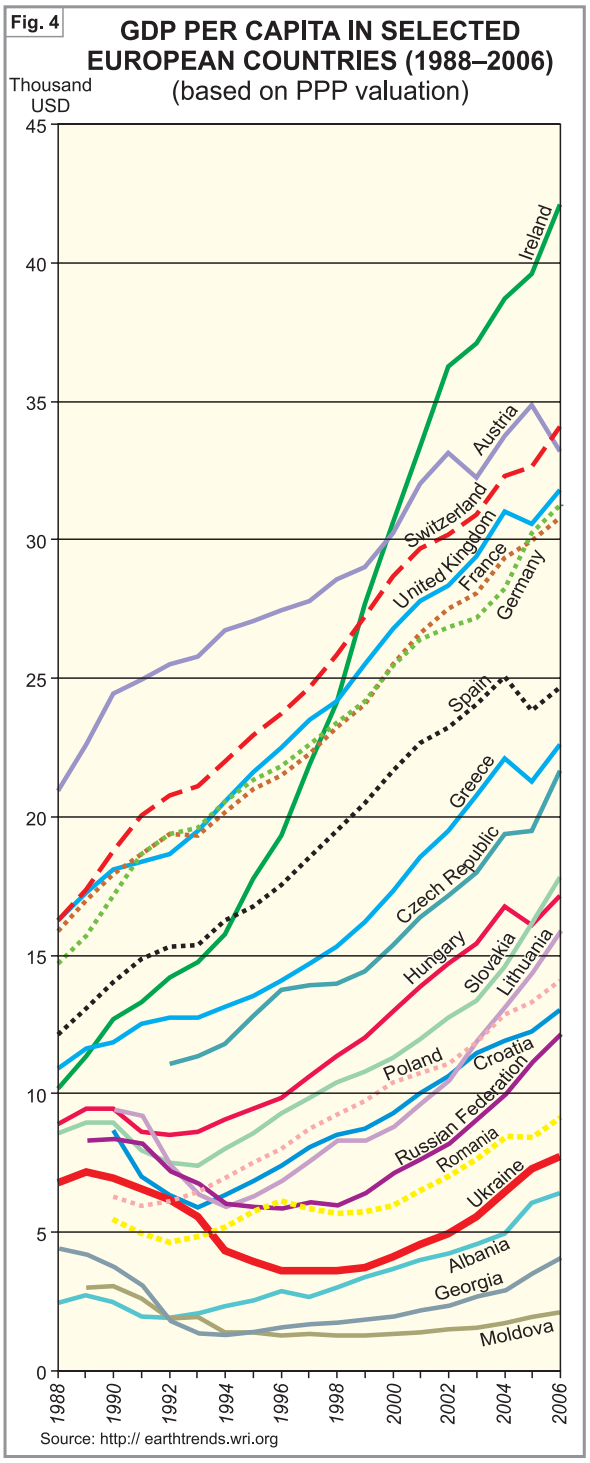
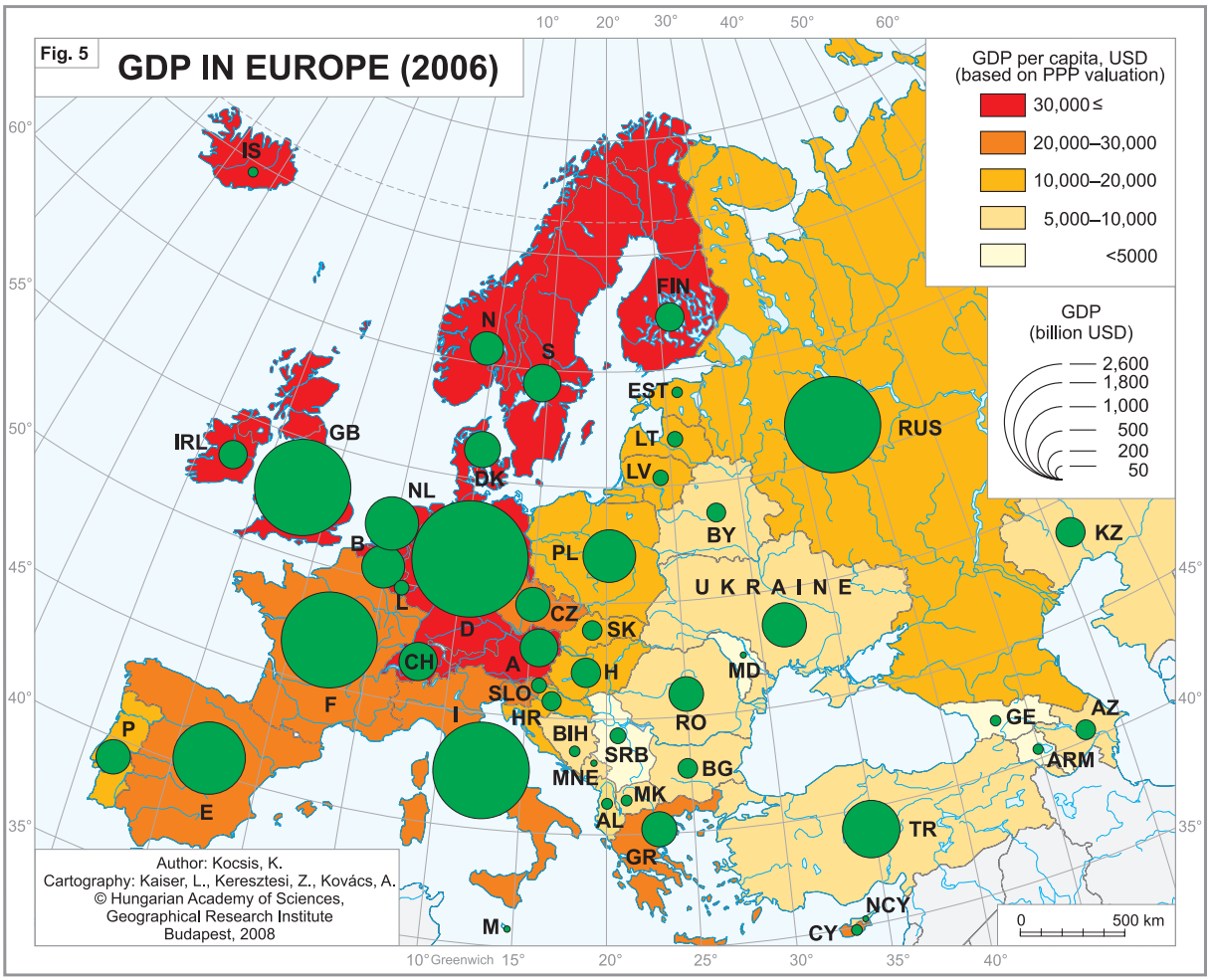


Fig. 4





comparison to the levels witnessed in 1989) by 10–15% in the Visegrad countries by 1991–1992; 20–30% in Southeast Europe by 1992–1993 and 30–40% in the Baltic states by 1993–1994. GDP had also sunk by approximately 30% in Belarus and the Russian Federation by 1997–1998, by 51% in Ukraine by 1995–1998 and by 58% in Moldova by 1998–1999.

The level of GDP last seen in 1989 only returned in Poland after 5 years, 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.

It is estimated that Ukraine will reach this level in 2007 (after 17 years), Georgia in 2009 (20 years) and Moldova in 2011 (22 years). Over the same period the developed western nations had increased their GDP by 80–110% between 1989 and 2006 and, it was Ireland (a nation of 4.2 million inhabitants) where – like an economic miracle – GDP growth reached 343% over the period mentioned. Ireland's GDP is half that of the 11 times more populous Ukraine.

When examining GDP per capita (30,000 USD or more, based on PPP valuation) the richest countries of Europe are to be found in the western part of central Europe and in north and northwest Europe (*Figures 3 through 5, Table 1*).

In several post-Communist countries – in addition to the effects of economic restructuring – devastating military conflicts and the serious damage that ensued has also contributed to the present situation.

As a result, GDP per capita in Moldova, Georgia, Armenia and Serbia with Kosovo falls below 5,000 USD. In this respect Ukraine was ahead of Romania, Bulgaria, Lithuania and Belarus in 1989, but for the time being, with its figure of 7,700 USD GDP per capita, it belongs amongst the group of less affluent countries in Europe.

Table 1. ***GDP data of selected European countries (2006)***

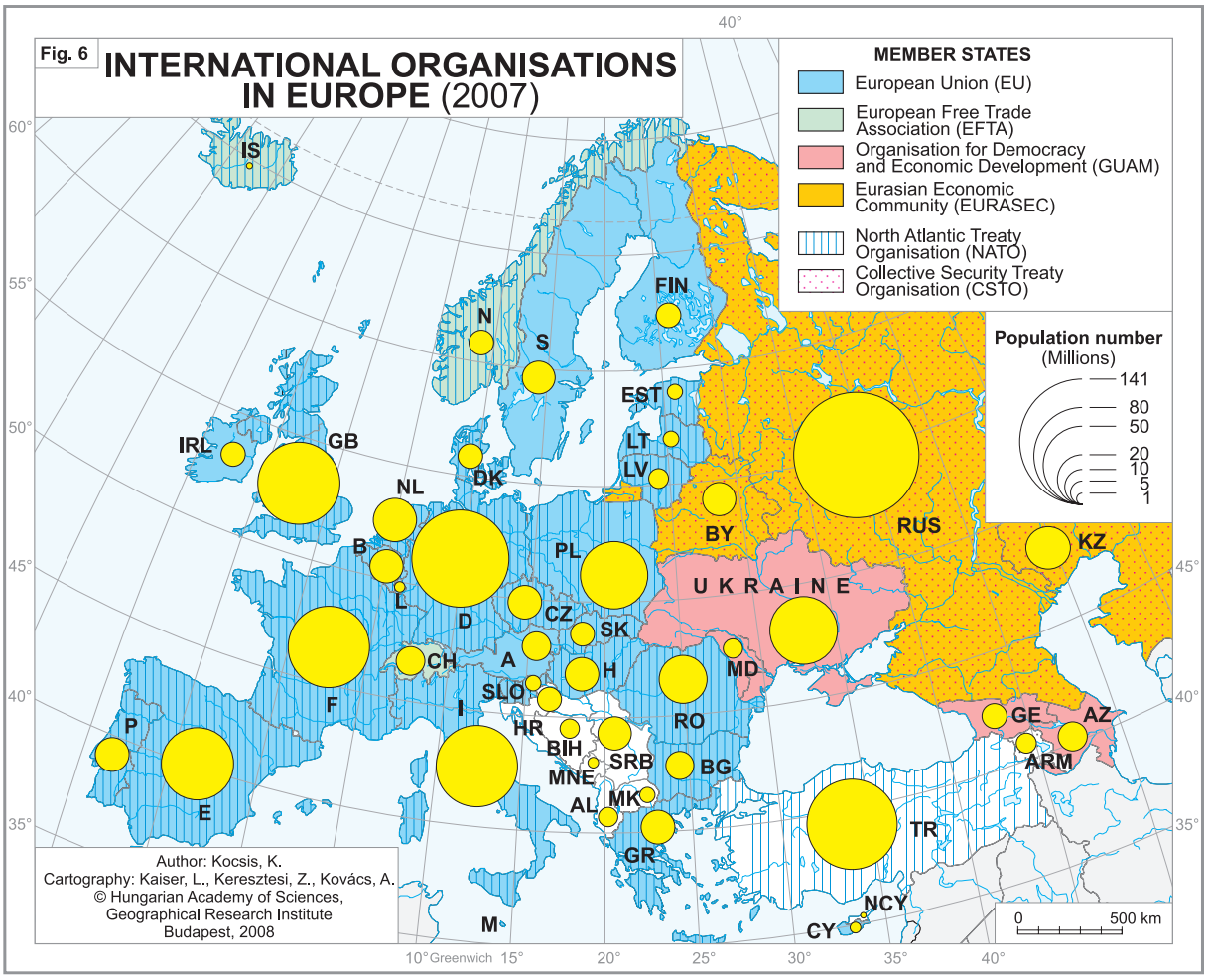
Country	GDP per capita, USD (based on PPP valuation)	GDP PPP total (in million USD)	Population number (in thousands)
Ireland	41,842.5	177.2	4,234.9
Austria	33,705.9	279.5	8,292.3
Switzerland	33,630.3	252.9	7,520.0
Germany	31,405.7	2,585.0	82,310.0
United Kingdom	31,397.9	1,903.0	60,609.1
Sweden	31,284.1	285.1	9,113.3
Netherlands	31,238.6	512.0	16,390.0
Italy	29,339.3	1,727.0	58,863.1
France	29,187.8	1,871.0	64,102.1
Spain	23,932.6	1,070.0	44,709.0
Greece	23,593.9	251.7	10,668.0
Czechia	21,521.9	221.4	10,287.2
Slovakia	17,646.5	96.4	5,460.0
Hungary	17,356.8	172.7	9,950.0
Lithuania	15,747.6	54.0	3,431.0
Poland	14,229.4	542.6	38,132.2
Russian Federation	12,185.3	1,723.0	141,400.0
Bulgaria	10,437.1	77.1	7,390.0
Romania	8,855.5	197.3	22,280.0
Turkey	8,545.0	627.2	73,400.0
Belarus	8,323.7	80.7	9,700.0
UKRAINE	**7,684.7**	**355.8**	**46,300.0**
Serbia	4,412.4	44.8	10,160.0
Georgia	3,976.3	17.8	4,474.0
Moldova	2,162.7	9.0	4,148.0

Source: www.cia.gov.cia/publications/factbook

Ukraine and the European international organisations

During the time of the collapse of the USSR, and immediately following this, several economic and military organisations emerged throughout the post-Soviet space. The disintegration itself coincided with the establishment of a loose confederation called *Commonwealth of Independent States* (*CIS*) formed by the former member republics of the USSR (with the exception of the "Baltic three") on December 21, 1991, essentially for the promotion of a "civilised divorce". (According to western analysts the real aim was to maintain the influence of the Russian Federation.) These days, the organisation is formal in character with the withdrawal of Turkmenistan in 2005 and the growing passivity of Georgia, Ukraine, Azerbaijan and Moldova, seeking orientation toward the West.

The latter four, using their initials, established *GUAM Organisation for Democracy and Economic Development* on October 10, 1997 with Kyiv as its center and a declared objective of counterbalancing Russian influence, yet, as a commanding necessity maintaining a close and friendly relationship with Russia for it plays a decisive role in all their economies (*Figure 6*). A common interest in efforts to resolve "frozen conflicts" in their territory (Abkhazia and South Ossetia in Georgia, Nagorno-Karabakh in Azerbaijan, Transnistria in Moldova) also unite these GUAM countries located in the buffer



zone between Russia, the EU and NATO and blaming problems for the presence of Russian military forces.

It was primarily the involvement of Ukraine and Georgia that encouraged the formation of a new bloc called *Community of Democratic Choice (CDC)*, the aim of which was also to reduce Russian influence. The group was formed in December 2005 with the participation of Ukraine, Georgia, Moldova and the post-Soviet Baltic states, joined by Romania, Macedonia and Slovenia. The *Eurasian Economic Community (EURASEC)* proclaimed a union of customs and tariffs within the CIS on October 10, 2000 (effective since May 31, 2001) consisting of Russia, Belarus, Kazakhstan, Kyrgyzstan, and Uzbekistan following its accession in 2006). In this organisation, with its market of 208 million people, Ukraine is merely an observer and – with a future wish to join the EU – rejects the acquiring the status of becoming a fully fledged member. An important factor in Ukraine's geopolitical situation is its status as a maritime power.

This partly explains why Ukraine is a founding member of the *Organisation of the Black Sea Economic Cooperation (BSEC)* formed on June 25, 1992 (effective since May 1, 1999) with the participation of the six countries with coastal access to the Black Sea along with another six: Greece, Albania, Serbia, Moldova, Azerbaijan and Armenia.

Apart from the foundation of economic organisations, the post-Soviet space seems to have additionally stimulated the emergence of a military-security bloc. On May 22, 1992 Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan and Armenia of the CIS member states signed a *Collective Security Treaty (CST)*. Another two former republics, Azerbaijan and Georgia joined before it became effective (April 20, 1994) but they withdrew in 1999 due to their western political orientation.

The remaining members reorganised the military bloc under the name *Collective Security Treaty Organisation (CSTO)* with its seat in Moscow. With the NATO accession of neigh-

bouring Hungary and Poland in 1999, followed by Slovakia and Romania in 2004, Ukraine has found itself in a ring of CSTO and NATO military unions and due to growing Euro-Atlantic sympathies it has of late emphasised its intentions to join NATO.

Ukraine and the European Union

In 1991, the year of the dissolution of the USSR, the *TACIS* program (Technical Assistance to the CIS) was launched by the European Community (EC), supporting post-Soviet countries (excluding the Baltic states) during the transition process towards democracy and a market economy. During the period between 1991–2006, Ukraine received €2,413.2 million from the EC (66% of it in the framework of the TACIS program). During the last years, the European aid focused on the following priority areas: support for institutional, legal and administrative reform; the private sector and economic development; and support in addressing the social consequences of transition. Relations between Ukraine and the EU are based on the *Partnership and Co-operation Agreement* (PCA) which entered into force in 1998. This agreement is the framework for political relations between the EU and Ukraine, fixing the primary common targets and fields of collaboration in the economy: trade-links and investment; technological, scientific and cultural cooperation. No doubt somewhat thanks to the fact that Ukraine has achieved *Most Favoured Nation* and *Market Economy Status* in its relationship with the EU, the community has become Ukraine's second largest trading partner. During the period between 1996–2006 the ratio of current EU members in Ukraine's total foreign trade increased from 24.6% to 33.6%, parallel with the decline in share of the Russian dominated EURASEC from 50.4% to 43.2%. It is remarkable that during the same period, the share of the Russian Federation in Ukrainian foreign trade decreased from 45% to 26.9%, which is a reflection on the country's decreasing dependence on Russia.

Ukraine is a very important transit country with oil and gas pipelines running from the east towards the EU. At the same time, the country may become an electric energy supplier and Ukraine is eager to become integrated into the energy network and market of the EU and south eastern Europe. Along with the safety of the hydrocarbon transport pipelines, nuclear safety forms an important part of energy collaboration. The *European Atomic Energy Community – Ukraine Agreement for Cooperation on the Peaceful Uses of Nuclear Energy* was signed in 1999 and has been effective since 2006. The EC has provided extensive support to Ukrainian Energoatom to modernise its nuclear power plants to meet internationally recognised safety standards, and the EC is also the largest contributor to the Chernobyl Shelter Fund, which works to rehabilitate the Chernobyl site. EC assistance has amounted to €621.1 million in the framework of TACIS Nuclear Safety between 1991–2006.

Since 2007 the relationship between the EU and its eastern neighbours (as a replacement for the TACIS program) has been regulated by the *European Neighbourhood and Partnership Instrument (ENPI)*, in the framework of which an *EU–Ukraine Action Plan* was adopted in 2005. The specific priorities of this Action Plan are the coordination of Ukraine's legislation with EU law, trade and investment, energy, environmental protection, transport and infrastructure, science and technology, and cross-border co-operation. A particularly important objective of the Action Plan is the convergence and integration of Ukraine's transport infrastructure into the European transport networks, including Pan-European Transport Corridors. EU–Ukrainian political dialogues cover the following topics: democracy, human rights, regional and international issues, along with security threats (e.g. terrorism and disarmament). Lately Ukraine and the EU have been intensifying their cooperation on foreign and security policy issues (e.g. in Bosnia, Macedonia and Transnistria).

SPECIFIC FEATURES OF HISTORICAL EVOLUTION

Through the turbulent course of history with its kaleidoscopic changes, Ukraine appeared on the geographical and political maps of Europe in the blink of an eye, disappearing from them just as suddenly, only to arise anew with a variety of names, territories and borders. It has experienced a troubled and unique history which is rooted in ancient times; a dramatic, yet sometimes tragic and heroic era; periods of crucial change contrasted with relative stability (which at times has verged on economic and political stagnation) as well as periods of state welfare and centuries of stateless existence. Its own heroes and anti-heroes figure large in the past.

The historical development of civilisation on Ukrainian soil is notable for its richness and variety. Ukraine's involved and complex reconstruction is only possible today if this process is a unity of considerations that are both objective and subjective, social and ethnic, collective and individual in nature. Society's development is not determined by a particular factor, and mankind's evolution has always been affected by a variety of influences: economic, political, ideological, religious, cultural, and more.

During their history that spans more than a millennium, the Ukrainians have passed over a long and difficult road of development. The successive change of archeological cultures, ancient and nomadic proto-civilisations as well as the formation of a quasi-Slavic state all took place on Ukrainian ethnic territory. According to archeological discoveries, the first group of native inhabitants that lived within the historical borders of modern Ukraine, can trace their roots back to Stone Age and the first archeological artifacts left by human activity date back to the Paleolithic period.

Waves of migration, which were typical for Europe during the Stone and Bronze Ages, influenced the ethno-genetic processes to a great extent, especially in such historical regions as: Polissia, Volhynia (Volyn), Podolia (Podillia), the Ukrainian Carpathians, Middle Dnipro Region and Nadporizhzhia. This migration also resulted in the development of specific archeological cultures on the left and right banks of the Dnipro river, coastal lowland of the Black Sea and the Dnister region.

The transition to the Iron Age (1000 years B. C.) was marked not only by evident climatic changes, which to a great extent caused the reduction in the native population over the entire territory of what would become in the future, Ukrainian ethnic territory. The Iron Age also witnessed a significant transformation of the territory's economics and way of life. Important features in the ethnogenesis of the Ukrainians were left by a number of cultures at particular reference points in history, such as Greek colonisers north of the Black Sea coast; nomads from the Eurasian steppe (the Scythian and Sarmatians); Thracian, Teutonic (German) and Baltic protocultures. The influence of ancient civilisations broadened the outlook of the native population of ethnic Ukrainian territories and enabled their engagement with European civilisation.

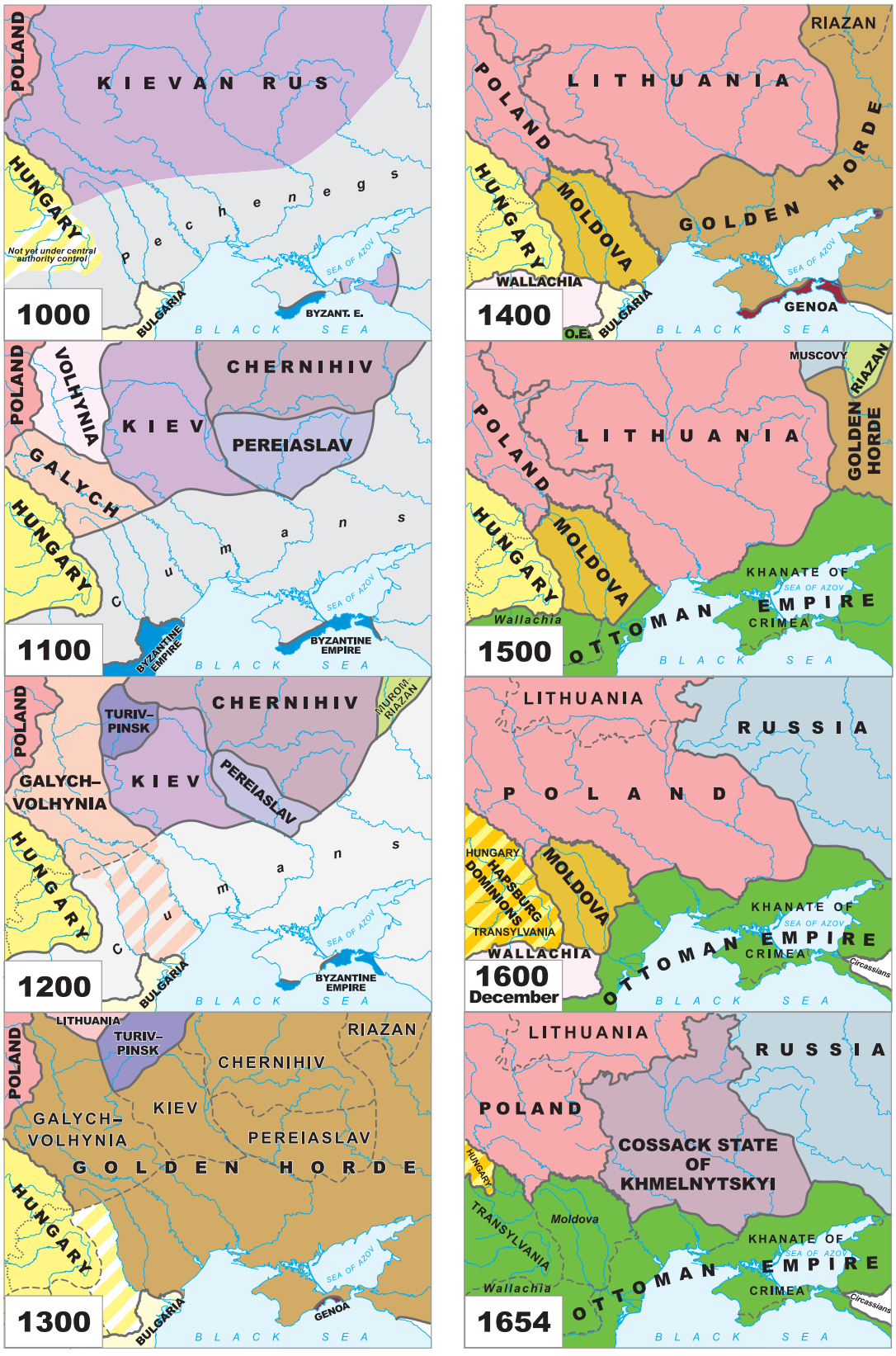
The period from 1000 B. C. – 1000 A. D. heralded the formation of the first groups of ethnic Slavs in the southeast Europe region. The Zarubintsy, Cherniakhiv and Kiev archeological cultures are representative of this development in Ukraine. At the turn of 4th and 5th centuries the confederation of Venedian tribes (which assimilated non-Slavic groups of the population) broke up into several independent tribes of Sklavians and Antes, who in turn, formed new archeological cultures. The first centuries of the Christian era were marked by the transition from the prehistoric period to the advent of the first historical tribes in the south and southwest territories of Ukraine, as well as the formation of late Scythian states on the Crimean steppe and in the Danube delta.

The massive settling of Slavs in the Ukrainian forest-steppe region in the second half of the first millennium was the impetus for the formation of Slavic "ethnic and cultural symbiosis", which would become the genetic core of Ukrainian nationality in the future.

The evolutionary development of Slavic tribal unions led to the establishment of economic, political and social institutions. The rise of the powerful Old Russian state, with its political centre in Kiev, took place in the final 300 years of the first millennium (*Figure 7*). Its golden age fell during the rule of Princes Volodymyr the Great

Fig. 7

STATES ON THE PRESENT TERRITORY OF UKRAINE (1000–1654)



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

(Saint) and Yaroslav the Wise. Owing to its military strength and dynastic marriages strengthening the power of the princes, the economic development of Kievan Rus', centralisation in its home and foreign policy, and cultural development following from its adoption of Christianity resulted in it becoming one of the most influential states in eastern Europe at the turn of 10th–11th centuries. However, the period of political, cultural and national development of this ancient Russian state was short-lived. Internal centrifugal processes, as a by-product of the previous development of this poly-ethnical state (which was, for a period of time the empire of the Rurik Dynasty which united different principalities of Slavic tribal unions and other non-Slavic groups) caused the gradual division of Kievan Rus' into 15 independent principalities in the 12th and 13th centuries. Under the prevailing conditions of political fragmentation, the baton founding the nation was taken by the Galych–Volhynian (Galicia – Volyn) state (*Figure 7*).

Further development of the Ukrainian nation included large territories, such as Kiev, Pereiaslav, Chernihiv–Siversk, Galych–Volhynia principalities, and it partly covered present-day areas of Bukovina and Transcarpathia (*Figure 7*). During the 15th–17th centuries the Ukrainians moved on to the south, colonising Slobozhanschina ("Free Ukraine"), and at the beginning of the 18th century settled in coastal regions of the Black Sea and Sea of Azov. Ethnic and social development took place under complicated conditions imposed by the division of Ukrainian territories. The existence of political borders was the reason distinctive features of differing regions of Ukraine were preserved.

Historical development for the Ukrainians in a variety of fields had far from stopped at this stage. During their ethnogenesis, the medieval Ukrainians were enriched by the experience of a social and national liberation movement, which has evolved into the modern Ukrainian nation, with its unique national consciousness, a highly developed sense of spirituality and culture. This complicated and controversial process receved new qualitative forms in the following centuries. The primary example was an economic union which took the form of close inner commercial and economic ties that fused the independent regions together, and also resulted in intensive migration between these regions.

During the so called Polish-Lithuanian period, the historical development of the Ukrainians had a specific character. Being part of the Grand Duchy of Lithuania, and later incorporated in Rzeczpospolita i.e. the Polish–Lithuanian Commonwealth, the Ukrainians on the one hand were enriched by progressive western European ideas, and on the other received important lessons in the struggle for national identity. The historical evolution of Ukrainians is fundamentally punctuated around this time by the formation of a new social community on the eastern borders: the Cossacks, who created original state form – Zaporozhian Army (Viysko Zaporizhske). In the political and religious fields the unions of Lublin (1569) and Brest (1596) were signed (*Figure 7*).

The time interval of a little over 200 years that historians called the Cossack period, occupies a very important place in the historical development of Ukraine (*Figures 7* and *8*). It was a crucial point in Ukrainian history, when the hitherto slow course of events abruptly accelerated in a cataclysmic manner and influenced the panoply of human activity. The result was a radical turn in Ukrainian history. The reasons that caused the appearance of the Cossack state, were complex and included economic, political, social, military and strategic factors. The Cossacks were the first ethnic community that came to reflect the characteristic features of the Ukrainians as an ethnically independent society. It would be difficult to overestimate the significance of the Cossacks in the development of the liberation movement and social struggle of the masses. Over a lengthy period of time, the Cossacks were the only force who would spar with neighbouring states in the name of the Ukrainians, fighting for their right to an existence and economic and spiritual development.

In the political field, the Cossacks established a new era of nation-building. The creation of Zaporozhian Sich, which was the Cossack conception of a state, meant that the Ukrainian state organisation was enriched by historical forms, which were inadequate for economic and social basis of late medieval community. A republican form of government and the participation of a wide circle of Cossacks in the decision-making process around economic and social problems resulted in Zaporozhian Sich becoming a strong political organisation with a wide field of activity. During the different periods of its existence,

Fig. 8

STATES ON THE PRESENT TERRITORY OF UKRAINE (1700–2007)

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

Zaporozhian Sich was not a "republic in itself", but always strove for expansion of its political sovereignty to the other Ukrainian lands.

The 1640s were marked by the event that fundamentally changed the course of Ukrainian history and predetermined it in many respects. The national liberation movement between the 1640s to the 1670s had no rival in Europe for its strength, scope and results. It is interesting to note that the revolutionary outburst occurred on the territory of the Cossack state (*Figure 7*). These revolutionary events kept their significance over the following decades, having a noticeable influence on all Ukrainian activities. The most significant consequence was the establishment of the Ukrainian Cossack state with its democratic forms of government, original legislature and executive power, which received well-defined national features. The establishment of the full range of state institutions took some years to achieve and occurred with permanent military operations and an increasing threat to independence inter-playing in the background. The vitality and great potential in the new state is easily explained by the fact that it was founded by the people themselves..

The period of Bohdan Khmel'nyts'kyi, or so called Khmel'nytchina, was not only when the independent state was established, but was also when Ukraine gained new political status on the European continent. It was a period of social upheaval that fundamentally influenced all strata of society and had a considerable impact upon the development of the national culture. Despite hardship arising from war, annexation of Ukrainian territory and obstacles placed by foreign conquerors, the nation continued to develop successfully in the general context of European cultural and historical process, enriching both global and Ukrainian cultural wealth.

Territorial incursion into the Ukraine during the last three decades of the 17th century caused certain divisions to arise in social, political and economic development between two large regions – the left-bank of the Dnipro (Livoberezhzhia) and Slobozhanschina on the one hand, and the right-bank of the Dnipro (Pravoberezhzhia) and western Ukrainian lands on the other. After the divisions of Poland in the 18th century and the reunification of the main regions of former Hetmanate (Hetmanschyna), it was eastern Galicia, northern Bukovina and Transcarpathia, that still remained outside the borders of ethnic Ukrainian territories. The Ukrainians were highly populous in the coastal lowland along the Black Sea (*Figure 8*).

The 19th century was an ambiguous era for the historical evolution of Ukraine. Despite being assimilated into the empires of the Hapsburgs and Romanovs (*Figure 8*), the Ukrainians managed to significantly develop their culture. The result of this was a phenomenon of cultural and national revival in the middle of the 19th century that further stimulated the development of a national movement at the turn of the 19th and 20th centuries. The Intellectual resources of the nation, which consisted of descendants of the Cossacks and Ukrainian nobles, was directed to save the heritage of the Ukrainians and took the form of collecting historical documents, artifacts, manuscripts from the Cossack period and folklore. New groups mushroomed as the national liberation struggle expanded, such as: "The search for Cossacks"; "New Haidamakschina" of Ustim Karmalyuk, the activities of the "Russian Troyka" in Galicia and the Cyril and Methodius Society in Dnipro (central–Ukraine). These groups were at outward expression of social phenomenon called "khlopomanstvo" and "hromadivstvo". National and cultural development, as well as the development of political and social ideas of the modern Ukrainian community were advanced by such people as Ivan Kotlyarevskyi and Mykola Lysenko; Taras Shevchenko and Lesia Ukrainka; Mykhaylo Drohomanov and Mykhaylo Hrushevskyi; Ivan Franko and Yurii Fedkovych, amongst others. At the same time the political, social and economic spheres themselves witnessed modernisation. Artistic masterpieces amongst the world's best in quality were produced and it is significant that the Ukrainian Renaissance - in spite of the destructive influence of the empires that divided Ukraine - without exception involved all Ukrainian regions, each of which had a unique local contribution to make.

The 20th century brought new ordeals for Ukraine. It was the century of wars and revolutions, famines and deportations, juxtaposed with a rejuvenated national renaissance and fresh attempts at nation building. The first Universal of Central council declared a right of self-determination for Ukrainians . Further steps taken towards nation building included the declaration of an independent Ukrainian People's Republic

(*Figure 8*); the establishment of the Ukrainian Hetmanate of P. Skoropadskyi in Dnipro–Ukraine; and the proclamation of a Western Ukrainian People's Republic in Galicia.

Once absorbed into the USSR (*Figure 8*), attempts were made to eradicate illiteracy. Thousands of people originally from working class and peasant families were allowed access to higher education and with time, to gain positions in high-level scientific, economic, academic, diplomatic and administrative posts. The possibilities that arose from an improvement in the national economy, to a hitherto unseen level of technological prowess resulted in a parallel growth in economic potential. This, together with the integration of the Ukrainian lands enabled Ukraine to raise its profile in the international arena. The final realignment of Ukrainian territory took place in the middle of the 20th century. After the Second World War, peace treaties defined the political borders of Ukraine and consolidated all ethnic Ukrainian territories, that were earlier parts of Poland, Romania and Czechoslovakia. The final touch to this process was added by Russia, when it handed Ukraine the Crimea peninsula in 1954 (*Figure 8*). Since the middle of the 19th century, the dispersion of Ukrainians has increased. The migration streams moved not only in easterly, southerly and northerly directions, but also further inland into Europe. Ukrainian diasporas appeared on the American and Australian continents. Many Ukrainians fell victim to both world wars (which lasted for years within Ukraine), along with mass repression and persecution by the Soviet authorities subsequently. The final three decades of the 20th century bought with it new ordeals for the nation to overcome. The process of urbanisation and industrialisation became an obstacle to agricultural development, which fell by the wayside. Meanwhile, the war in Afghanistan, as well as the Chernobyl disaster had a negative impact on the country's demography.

Ukraine managed to avoid becoming embroiled in armed conflicts that erupted in some of the territories of the former Soviet Union after 1991 (*Figure 8*). The nation building process today charts its path next to the struggle for old and new, and is accelerating. A modern social and economic pattern is emerging and these processes carry on parallel with the integration of Ukraine into the global community. While investigating some aspects of Ukrainian history, researchers may miss the universal historical context, but it is known that Ukrainians have never existed in isolation. Circumstances have many times developed in such a way, that this old European nation found itself at the centre of the historical evolution of Europe and events that took place in Ukraine had an important meaning not only for central and eastern Europe, but for the whole European mainland too. Situated at the crossroads of economic and commercial arteries between East and West, North and South, from ancient times Ukraine was a recipient of hostility from martial tribes. The country's location has saved other European countries from devastation on numerous occasions by acting as a buffer, but was nevertheless a destructive experience for Ukraine which later became the hostage of the geopolitical interests of neighboring countries.

Those who believe that Ukraine's role was passive, under conditions of permanent foreign policy pressure, are wrong. On the contrary, Ukraine not only resisted this pressure (and very often successfully), but also became an active influence on European international relations during certain periods of time. Coming under the direction of European civilisation, Ukraine felt an impact on its political, economic, social, and cultural development, but at the same time, original Ukrainian thoughts and actions repeatedly impacted on eastern Europe, enriching not only European political thinking, but also its practice.

NATURAL CONDITIONS AND RESOURCES OF DEVELOPMENT

Natural conditions across Ukraine show considerable variety. This is due to an intricate combination of geological structures from differing ages and the result of a diverse composition and related mineral resources. Additional variation across the country is represented in the distribution of mountains and plains, surface and subsurface waters, air temperatures and moisture. Climatic conditions have favoured the formation of a wide range of soils and diverse wildlife – vegetation and fauna – all reflected by physico-geographical features and landscapes.

The **relief** of Ukraine consists mostly of plains, which make up 95% of its total area and belong to one of the largest of their kind – the East European Plain. To the south and southwest they are flanked by the mountains of the Crimea and the Carpathians. The average elevation of the plains is 175 m above sea level and reach a maximum height at Mount Berda (515 m), whereas the minimum levels are in the range of 0–15 m. There is a general orographical sloping from the north to the south and from the west to the east – the latter towards the Dnipro Valley, occupying a central position over the territory of Ukraine (*Figure 9*).

Another characteristic feature is a complex pattern of uplands and lowlands, the axes of which are orientated sublatitudinally, in a northwest–southeast direction. The plains include the following uplands: Podillian (with mean altitudes of 300–400 m and a maximum of 367 m); Donets (200–250 m, max. 367 m); Dnipro (150–240 m, max. 323 m); Volhynian (220–280 m, max. 342 m); and southwestern reaches of the Central Russian Upland (200–340 m). The following lowlands are also included: Black Sea Coastal lowland (0–170 m, max. 179 m), Dnipro (50–170 m, max. 236 m), and Polissian lowland (150–200 m, max. 316 m).

The mountains of Ukraine belong to the categories of low and middle mountains in elevation. The Ukrainian Carpathian foothills have altitudes from 300–400 m on the northeastern and southwestern macroslopes, up to summit levels of 1,500–2,000 m (with Mount Hoverla as the highest peak reaching 2,061 m). The Crimean Mountains span average altitudes from 250 to 1,200 m with Mount Roman-Kosh as the highest (1,545 m). These mountain systems can further be subdivided into a series of orographic units of lower rank.

The present-day topography was sculpted in late Cainozoic times (including Quaternary) by a complex interaction of endogenous (internal) and exogenous (external) forces, and human-induced processes of relief formation. As a result of predominantly unidirectional and oscillating neotectonic crustal movements, volcanic and seismic processes have led to different proportions between accumulation and denudation. Plains evolved on the platforms and orogenic morphostructures formed.

The former are represented by socle plains, plains built, and hills formed upon horizontal strata (structural denudational, and denudational), and by aggraded plains of different genesis and age (mainly of glacial and fluvial origin). Mountain morphostructures belong to the collisional orogens type. They are represented by middle and low mountains of denudational tectonic, structural denudational and volcanic origin. Within piedmont troughs (Ciscarpathia, Transcarpathia and Indolo-Kuban) and in the adjoining mobile portions of platforms, morphostructures of transitional zones have been formed, to be found between mountains and plains predominantly with structural denudational and denudational relief.

Morphostructures on Ukraine's territory are manifest in the combination of relic and recent zonal, and azonal landforms of exogenic origin. Relic morphostructure is associated with the activity of early and middle Pleistocene inland glaciers having extended to the northern and central parts of the country's territory, and with that of mountain glaciation during the late Pleistocene. Recent morphostructures are represented by fluvial, gravitational, karstic, eolian, marine, lacustric and biogenic landforms. Present-day processes of relief formation – chiefly denudation – have a great part to play in soil degradation and they are frequent sources of other adverse processes.


Fig. 9
PHYSICAL MAP
MAZOVIAN LOWLAND
BELARUSIAN LOWLAND
POLISSIAN LOWLAND
Volhynian Hills
LUBLIN UPLAND
LITTLE POLISH UPLAND
Roztocze
VOLHYNIAN UPLAND
Poychans'ka Upland
Mizoch Ridge
Kremenets Hills
Holohory
Opilska Upland
Tovtry
DNIPRO UPLAND
Kyiv reservoir
Kaniv reservoir
Kremenchuk reservoir
Dnister reservoir
Kakhovka reservoir
Slobozhanskyi Upland
Central Moldavian Upland
South Moldavian Upland
North Moldavian Hills
Nistrul de Sus Upland
Bârlad Hills
Moldovan Upland
Suceava Hills
Dobrogea Hills
Baragan Plain
LOWER DANUBIAN (ROMANIAN) LOWLAND
PODOLIAN UPLAND
EASTERN CARPATHIANS
Eastern Beskids
Uzhoks'kyi Pass
Veretskyi Pass
Vyshkivs'kyi Pass
Yablunits'kyi Pass
Prokuttia - Bukovinian Carpathians
Marmarosh Mountains
Gutâi Mts.
Tibleşu
Rodna Mts.
Stanişoara Mountains
Călimani Mts.
Bicaz Pass
Tarcău Mts.
Hărghita Mts.
Vrancea Mts.
Curvature Carpathians
Ceahlău Mts.
Ceşa Mountains
TRANSYLVANIAN BASIN
APUŞENI MOUNTAINS
Metaliferi Mountains
SOUTHERN CARPATHIANS
Cindrel 2244
Făgăraş Mountains
Moldoveanu 2544
PANNONIAN (HUNGARIAN) LOWLAND
SLOVAKIA
HUNGARY
ROMANIA
BELARUS
UKRAINE
MOLDOVA
BLACK SEA
BUCUREŞTI
KYIV
CHIŞINĂU
ODESA
LUTS'K
RIVNE
ZHYTOMYR
L'VIV
TERNOPIL'
KHMEL'NYTS'KYI
VINNYTSIA
CHERNIVTSI
IVANO-FRANKIVS'K
UZHHORODKOŠICE
PREŠOV
RZESZOW
LUBLIN
BREST
GOMEL
Slovechne Ovruch Ridge
Berda Khotyn Upland
Zmiynyi (Snake) Island (Ukraine)
m
2500
2000
1600
1400
1000
800
500
300
200
100
50
0
0
50
100
200
500
1000
1500
2000
Salt lakes
24° East of Greenwich
24°
25°
26°
27°
28°
29°
30°
31°
52°
51°
50°
49°
48°
47°
46°

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Kyiv, 2008
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Budapest, 2008
CENTRAL RUSSIAN UPLAND
OKA-DON PLAIN
RUSSIA
UKRAINE
PRIDNIPRO LOWLAND
Poltava Plain
DONETS UPLAND
Donets Ridge
AZOV UPLAND
COASTAL LOWLAND
KUBAN LOWLAND
CAUCASUS
CRIMEAN MOUNTAINS
North Crimean Lowland
Tarkhankut Upland
SEA OF AZOV
Gulf of Taganrog
Gulf of Karkinits'ka
BLACK SEA
Hremiach
KURSK
CHERNIHIV
SUMY
BELGOROD
KHARKIV
POLTAVA
CHERKASY
Chervona Zirka
LUHANS'K
KIROVOHRAD
DNIPROPETROVS'K
DONETS'K
ZAPORIZHZHIA
ROSTOV-NA-DONU
MYKOLAIV
KHERSON
KRASNODAR
SIMFEROPOL'
SEVASTOPOL'
Kremenchuk reservoir
Dniprodzerzhyns'k reservoir
Dnipro reservoir
Kakhovka reservoir
Dnipro-Donbas canal
Dnipro lyman
Tendrivska kosa
Kosa Byriuchyi Ostriv
Kosa Arabats'ka Strilka
Tuzla Island
Cape Tarkhankut
Cape Yevpatoriia
Cape Khersones
Cape Sarych
Cape Mehanom
Cape Chauda
Angars'kyi Pass 752
Roman-Kosh 1545
Ai-Petri 1234
Mohyla-Mechetna 367
Mohyla-Honcharykha 277
Bel'mak-Mohyla 324
Thab 1545
Seim
Don
Dnipro
Samara
SCALE 1:4 000 000
0 50 100 150 200 km

Relief conditions have a strong impact on the spatial differentiation of soil and vegetation cover, and on climatic parameters within physico-geographical and higher level landscape taxa. Present-day natural processes of relief formation are instrumental in provoking mass movements (*Figure 10*).

The **geological structure** of the territory of Ukraine has resulted from a long and complex evolution, lasting for more than 3.8 billion years. In tectonic terms, the East European and (partly) West European platforms, Scythian plate and Paleozoic folded structures (Donets folded structure), Kimmerian-Alpine (Crimean Mountains) and Alpine (Ukrainian Carpathians) are of utmost importance. Basic regional platforms and orogenic geostructures have formed in different geodynamic stages: along island arcs and active continental margins, in internal parts of plates and aulacogens, in depressions situated in the interior parts of continents, collisional orogens, etc.

In the stratigraphical sequence of geological build-up, the rocks and sediments represented are those formed from the Archean up to the Quaternary. Of them, Archean and Proterozoic sedimentary-volcanogenic and volcanogenic deposits; metamorphic formations; and metasomatite rocks and granites are the most ancient and together they compose the crystalline fundament of the Ukrainian shield. The Phanerozoic sedimentary strata includes deposits of the Cambrian eratem, and those of Ordovician, Silurian, Devonian, Carboniferous, Permian, Triassic, Jurassic, Cretaceous, Paleogene, Neogene and Quaternary systems.

Ukraine is richly endowed with **mineral resources,** which can be attributed to geological formations of various ages and different tectonic structures in its territory. There are more than 20,000 proven occurrences of 97 different minerals in Ukraine. Due to their wide range and vast quantities, Ukraine is a country gifted with one of the widest selections of minerals worldwide.

For the national economy in general and industrial development in particular, the most important deposits are iron, manganese and uranium ore; coal, gas and condensate; oil fields; occurrences of titanium, zirconium, kaolin and graphite; non-ore raw materials for metallurgy; and decorative stones and minerals, along with thermal waters.

Deposits of ***oil and gas*** are concentrated in the Dnipro–Donets, Carpathian and Black Sea–Crimea regions, situated in tectonic depressions of the East European Platform, Scythian Plate, piedmont troughs and continental shelves of the Black Sea and Sea of Azov (*Figure 11*). These regions include four provinces, and ten oil and gas-bearing areas. Over 300 sources of oil and gas are already explored in Ukraine and around 60 of them have significant proven reserves. Prospects of increasing quantities of recoverable hydrocarbon resources are promising, even if there is a sharp deficit of these types of energy source for the time being.

Estimated hydrocarbon resources exceed 8,400 million tons in oil equivalent, 27% of which are to be found predominantly at a depth of 5–7 km. By 2004, 26% of the initial resources had been extracted and 14.8% explored; the level of their realization was 45.8%. Solid fuels are found in the form of ***hard and brown coal, oil and menilitic shales*** and are to be found in the Donets, Lviv–Volyn, and Dnipro coal basins, and also in the Carpathians, Crimean Mountains and in Volyn–Podillia. An overwhelming part of hard coal reserves (*Figure 12*) are located in the Donets Basin (Donbas), where out of the 330 coal seams of Carboniferous origin, 180 are commercial. The total estimated resources of coal in Ukraine exceed 100 billion tons. Brown coal fields are primarily also found in the Dnipro Basin, interbedding in Paleogene deposits and situated at a depth between 10 and 150 metres below the surface, and in some places they are worked opencast.

Deposits of oil shale are encountered on the Ukrainian Shield, Volyn–Podillian Plate, in the Carpathian and Crimean Mountains, and the Bovtyshka Depression. Menilitic shales are frequent in the Ukrainian Carpathians.

With respect to ***ferrous and ferrous-alloy ore***, Ukraine is the world's fifth largest producer of iron ore and the leader in manganese ore production, providing 4% of iron and 8% of manganese (*Figure 13*). There are 80 sites of iron ore occurrence with a general reserve of more than 30 billion tons. They are in the Kryvyi Rih Iron Ore Basin, in ore regions at Kremenchuk, Belozersk and along the coast of the Sea of Azov. Additionally there are deposits within the Ukrainian Shield and in the Kerch Iron Ore Basin in Crimea.

Manganese ores are centered on the Nikopol Ore Basin within the Ukrainian Shield. As far as general reserves are concerned, Ukraine

Fig. 10

HUMAN-INDUCED TRANSFORMATION OF THE RELIEF

Authors: Barschevskyi M., Zhylkin S., Palienko V.
Cartography: Prokop'ieva, V. SSPE Kartohrafiia
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Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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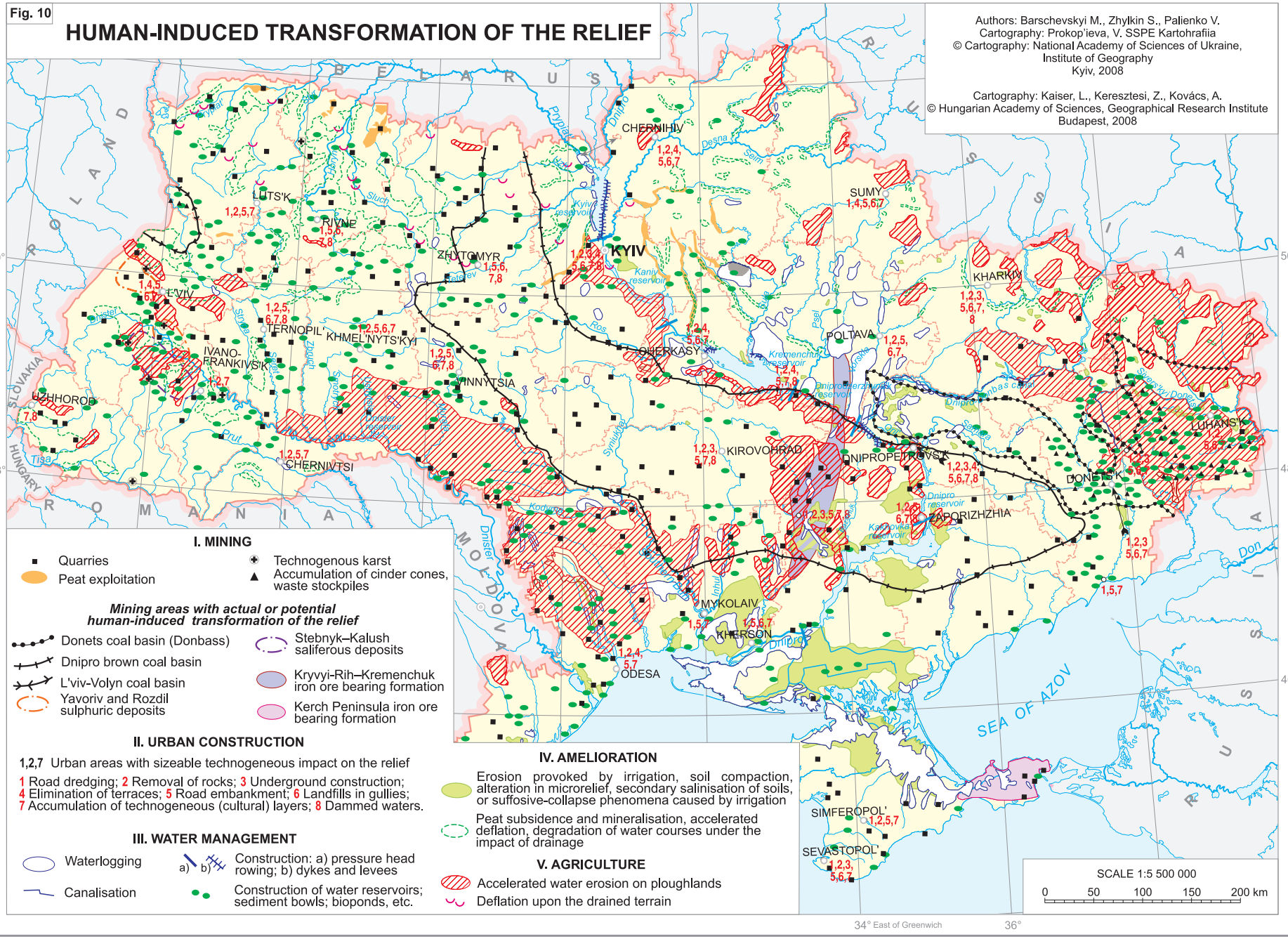


I. MINING

- Quarries
- Peat exploitation
- Technogenous karst
- Accumulation of cinder cones, waste stockpiles

Mining areas with actual or potential human-induced transformation of the relief

- Donets coal basin (Donbass)
- Dnipro brown coal basin
- L'viv-Volyn coal basin
- Yavoriv and Rozdil sulphuric deposits
- Stebnyk–Kalush saliferous deposits
- Kryvyi-Rih–Kremenchuk iron ore bearing formation
- Kerch Peninsula iron ore bearing formation

II. URBAN CONSTRUCTION

1,2,7 Urban areas with sizeable technogeneous impact on the relief

1 Road dredging; **2** Removal of rocks; **3** Underground construction; **4** Elimination of terraces; **5** Road embankment; **6** Landfills in gullies; **7** Accumulation of technogeneous (cultural) layers; **8** Dammed waters.

III. WATER MANAGEMENT

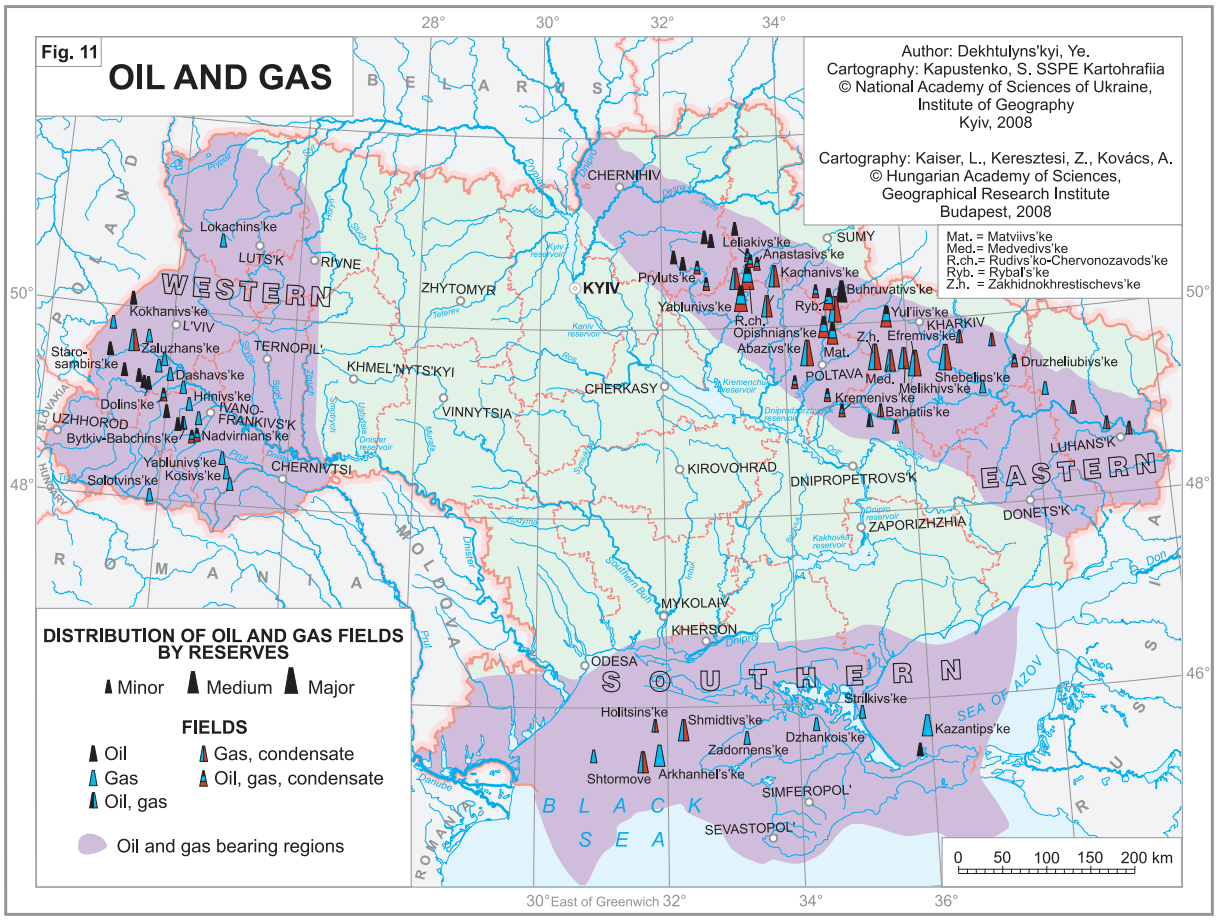
- Waterlogging
- Canalisation
- Construction: a) pressure head rowing; b) dykes and levees
- Construction of water reservoirs; sediment bowls; bioponds, etc.

IV. AMELIORATION

- Erosion provoked by irrigation, soil compaction, alteration in microrelief, secondary salinisation of soils, or suffosive-collapse phenomena caused by irrigation
- Peat subsidence and mineralisation, accelerated deflation, degradation of water courses under the impact of drainage

V. AGRICULTURE

- Accelerated water erosion on ploughlands
- Deflation upon the drained terrain



has 43% of the global total and with respect to explored reserves (2.5 billion tons) the country occupies second place globally. Chromite is also worked at the middle reaches of the Buh River (Ukrainian Shield). Ukraine is self-sufficient in raw materials for its iron and steel industries.

Gold has been mined in Ukraine for a long time, although gold-bearing capacities have not yet been sufficiently studied. For the time being there are 240 proven deposits and ore occurrences are found within three gold-bearing regions: on the Ukrainian Shield, in the Carpathians and the Donbas region. Prospecting has led to a conclusion about resources being associated with the activity of transregional sublatitudinal structures in central and north Ukraine, traversing diverse geostructures and also controlling the metallogenesis of non-ferrous and *rare metals*, e.g. that of silver and fluorite. Occurrences are concentrated on the Ukrainian Shield – a vast province of rare metals, such as beryllium, uranium, vanadium, scandium, niobium, zirconium, tin, molybdenum, tungsten, ilmenite, etc. Ukraine's potential reserves of rare earth elements are the largest in Europe.

Over 100 occurrences of ***diamond*** and related minerals have been found on the Ukrainian Shield, in the Donbas region and on the Volyn–Podillian plate. They are associated with north, central and south Ukrainian megazones of activation and with impact structures.

With regards to ***non-metallic*** minerals, sulphur and potassium salt is worked in Ciscarpathia, table salt in Crimea, rock salt in Donbas, and chalk for the making of soda in the Carpathians. There are occurrences of non-ore raw materials for iron and steel smelting (quartzites, fire-resistant clays, dolomites, flux limestones, foundry sands), for cement production (limestones, chalk, marble, clay, gaize) and for glass, porcelain and faience production (quartz sand, kaolin, feldspars). In recent years, prospective deposits of apatite and phosphorite were discovered for the manufacture of fertilisers.

There are more than 3,000 quarries for ***construction materials*** – brickearth, perlite, haydite clay, building sand etc, and over 200 for materials used for decorative purposes. Ukraine is extremely rich in various precious stones. On its territory, 155 occurrences are to be found with

Fig. 12

SOLID MINERAL FUELS

Authors: Radzivill, A., Pristinska, L.,
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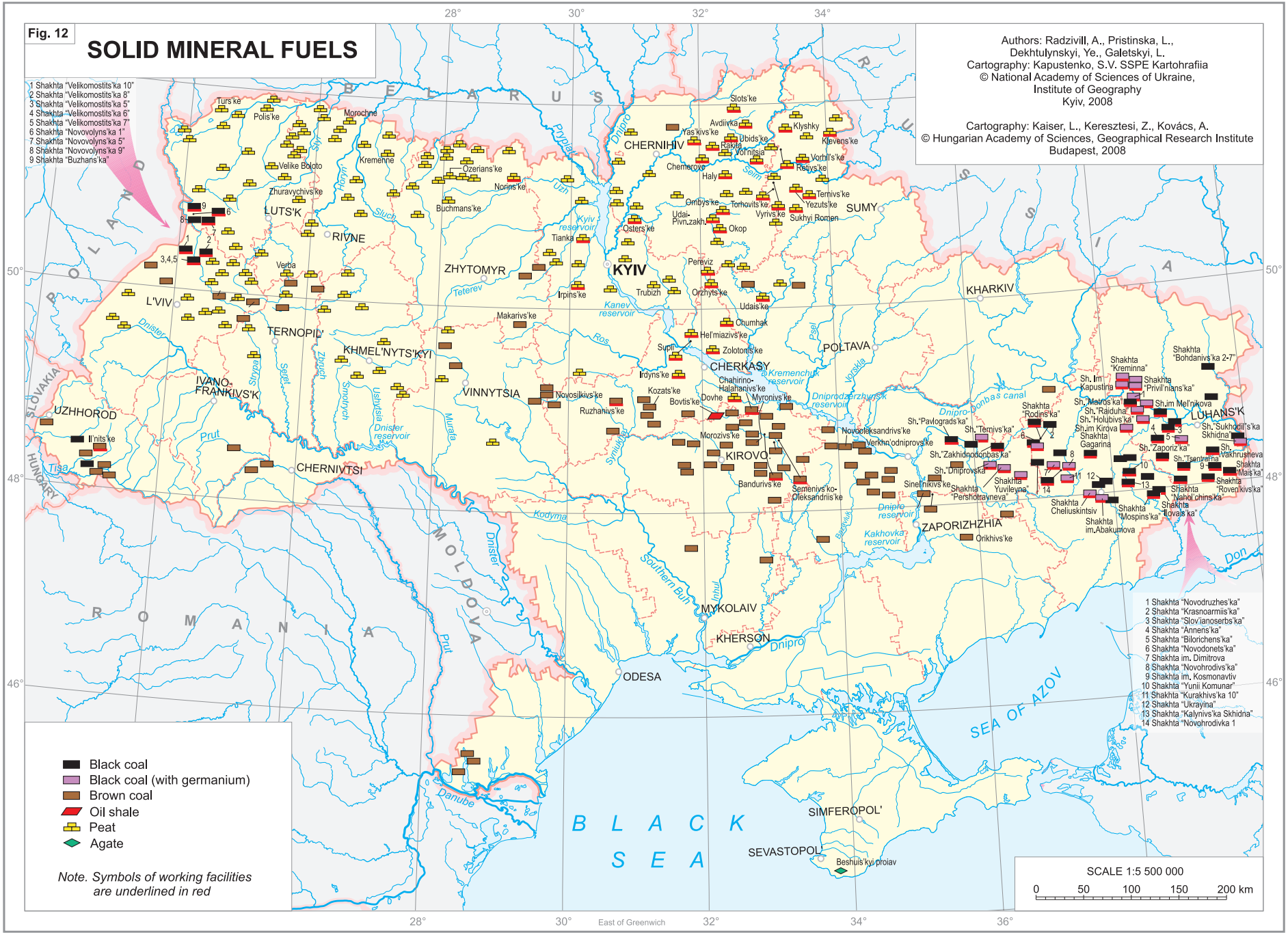
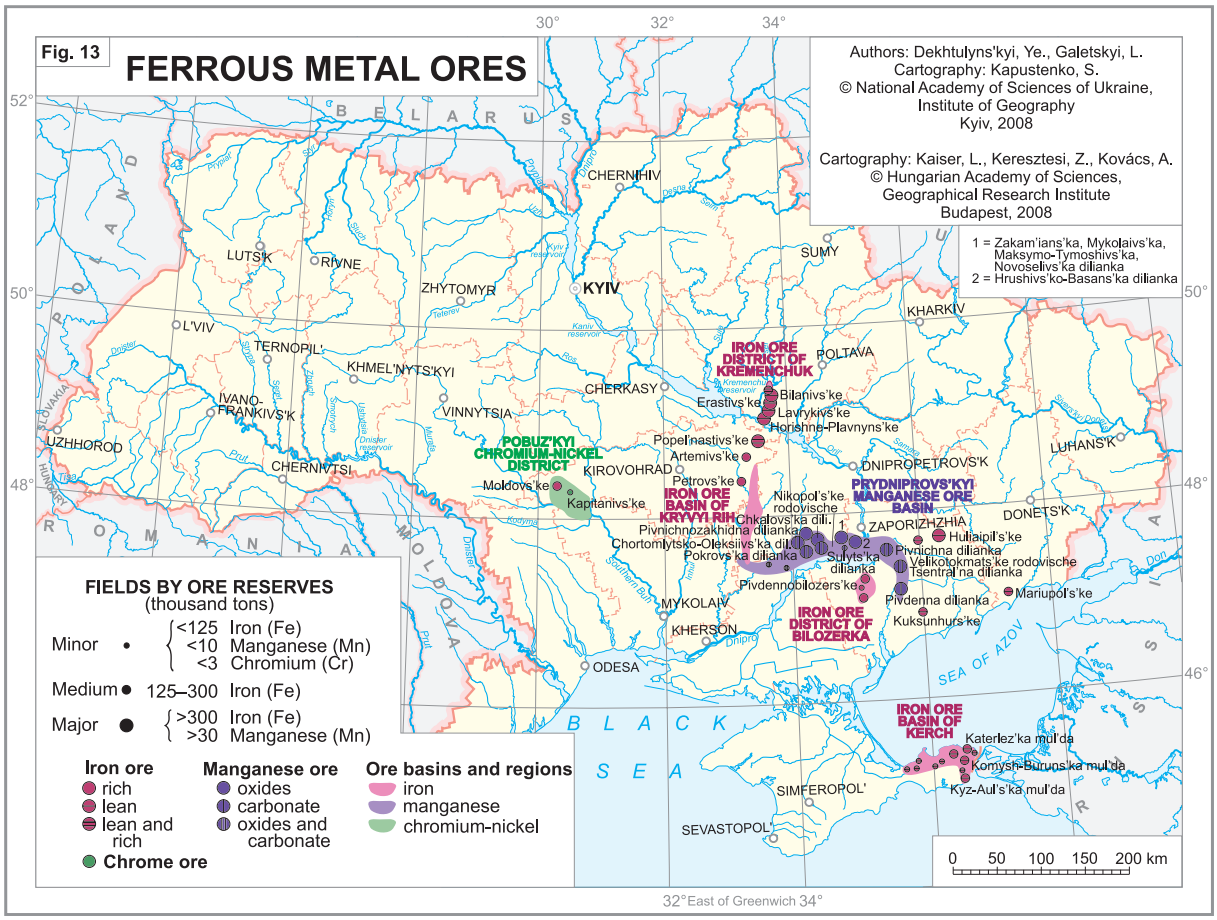




proven reserves of 500 million m^3 of stones, and 79 of them are worked. They are concentrated on the Ukrainian Shield, in Volyn, along the Dnipro River and the coast of the Sea of Azov. The stones quarried are topaz, beryl, morion, crystal, opal, garnet, and various decorative stones (granite, gabbro, marble, labradorite).

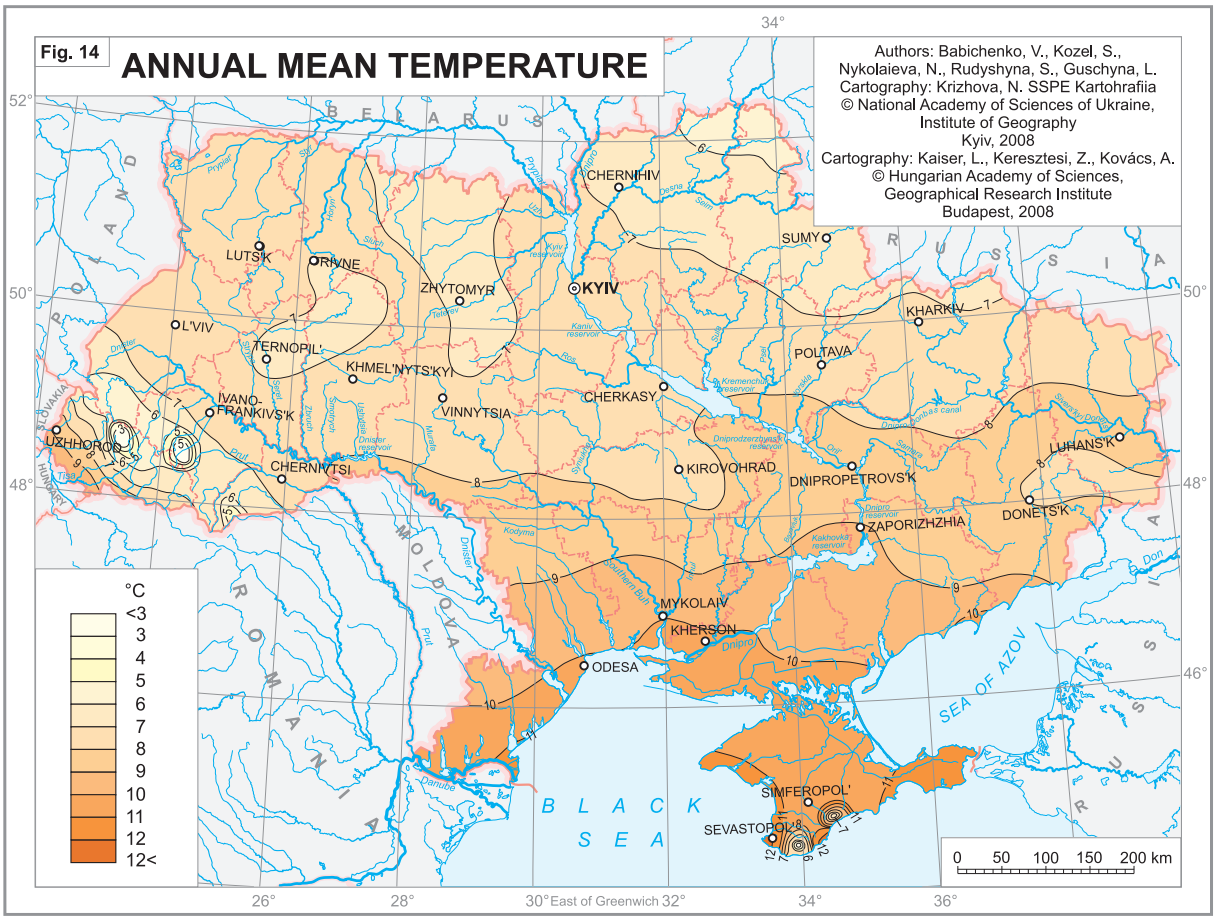
Geothermal resources of the country (in Ciscarpathia, Transcarpathia, on the plains of Crimea, the Kerch Peninsula and the Donbas region) are rich and the future prospects are good with a view to the long term. For the time being only 4% is used for energy generation. With respect to mineral water reserves, Ukraine is one of the world leaders. 110 sources of mineral water have been explored, and they demonstrate extremely diverse compositions. Carbonic, nitrate, methane, nitrate-methane, oxygen-nitrate, radonic and hydrosulphuric waters are encountered in several provinces. Azonal mineral waters with an organic hydrochemical composition of the "Naftusia" kind are widely known and have acquired popularity.

Recently, growing attention has been devoted to the recycling of industrial waste stored at depositories, i.e. ***technogeneous deposits***. Currently, Ukraine utilises a mere 12% of such waste matter.

Abundant and diverse mineral resources form the basis of, and provide raw materials for a variety of economic sectors: ferrous and non-ferrous metallurgy, oil refining, the engineering industry, the manufacture of chemicals and cement, etc.

Climate is one of the most important natural resources decisive in creating conditions suitable for human activities. Ukraine is overwhelmingly located within the temperate climatic zone, comprising forests and steppe, Atlantic and continental regions. Only the southern coast of Crimea enjoys true Mediterranean features, being situated in the subtropical zone (*Figure 14*).

The main characteristics of the climatic conditions and resources of Ukraine have formed under the influence of solar radiation factors, a regime of atmospheric circulation and features of the Earth's surface. Of them, the duration of ***solar radiation*** is the most important, which has a zonal-provincial character. Minimum dura-

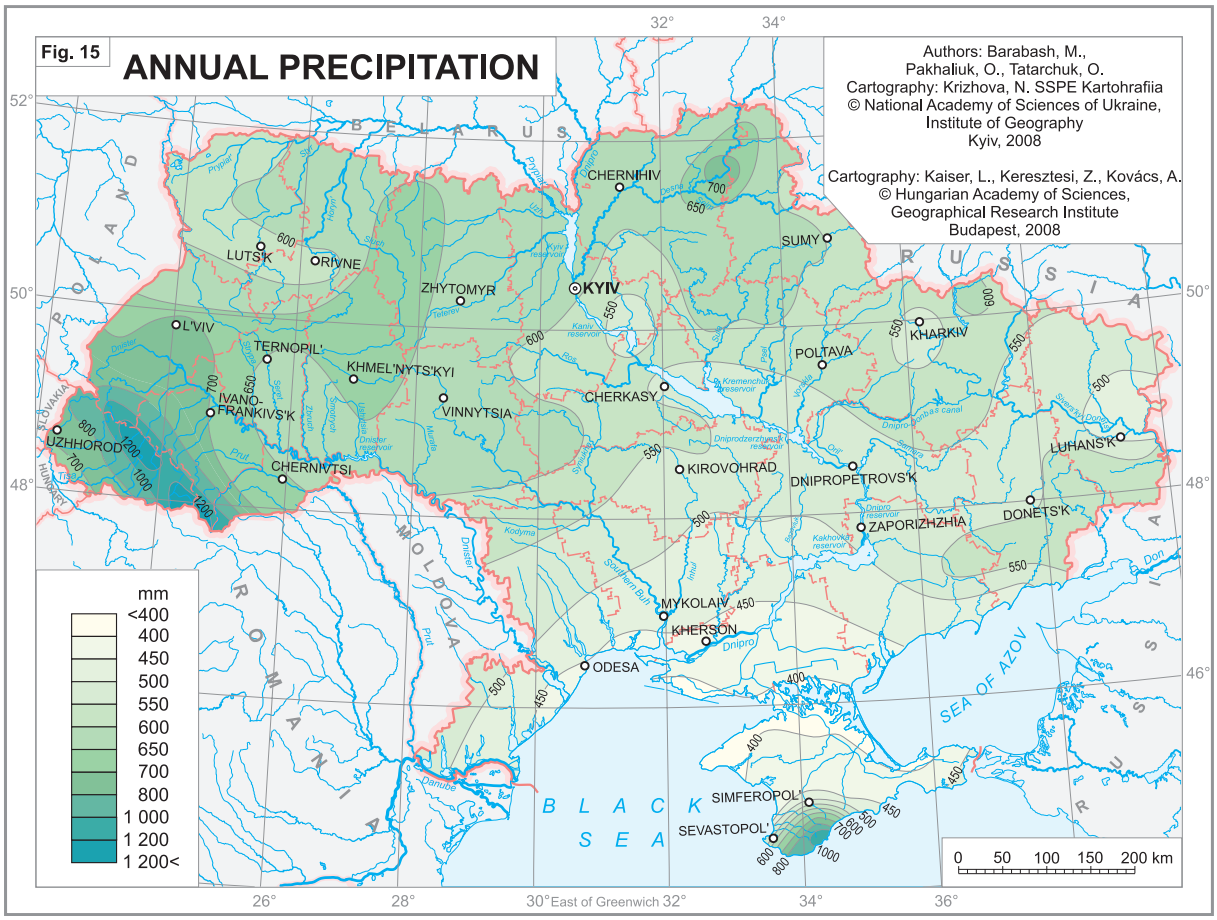


tion occurs in December in the zone of mixed (coniferous–decidious) forests with 30 sunshine hours, up to 45 hours for the forest steppe zone and a maximum of 65 hours for the steppe zone. Maximum duration is typical for July: 240–300 hours in the mixed forest and forest steppe zones and 310–350 hours in the steppe. The minimum amount of sunshine hours during the year occurs in the western part of the mixed forests and forest steppe (1,700 to 1,800 hours), whereas the maximum occurs at Karaby Yaila (2,453 hours) and Simferopol' (2,458 hours). Seasonal distribution of direct solar radiation and its annual total have a strong influence upon the functioning of landscapes. Minimum values are recorded in December (60–100 MJ/m^2) and maximum values are typical in summer (1,600–2,100 MJ/m^2).

Atmospheric circulation is responsible for the distribution of temperature and moisture on the Earth's surface (*Figure 15*). In Ukraine, the typical pattern is the transport of air masses from the Atlantic via westerly winds, and the flow of Arctic and continental air masses from Eurasia. In the variation of climate, an important role is played by cyclones and more than 40 are recorded annually in Ukraine, with each season bringing five to seven anticyclones. In the summer and autumn, anticyclones arrive from the west (Maximum of Azores). In winter the influence of the Siberian anticyclone is manifested and there are frequent invasions of cold air masses of Arctic origin.

Topography has an impact on cloud cover and the distribution of solar radiation. During the winter, the level of solar radiation is the highest in the Ukrainian Carpathians and Crimean Mountains (420–460 MJ/m^2). Mountain ridges protect Transcarpathia and the southern coast of Crimea from the invasion of cold Arctic air masses. An impact of the seas upon climatic conditions is also felt. In winter, the sea promotes a rise in the air temperatures of coastal areas. Water reservoirs, lakes, and different kinds of land cover (woodland, grassland, cropland) are all decisive for the fluctuations in the radiation balance, and are instrumental in the distribution of climatic characteristics.

During the calendar year, climate influencing factors vary by season. The coldest is *winter*, when mean daily temperatures drop



below 0ºC and remain negative. Winter begins in November and the phenomenon described above is moving from the northeast to the south and southwest. January is the coldest month with mean daily temperatures between -7 – -8ºC in the northeast and 3ºC along the southern coast of Crimea. The lowest values of absolute minima were recorded in January (-42ºC) and February (-39ºC). During the winter season weather conditions are controlled by air masses transported from the Arctic, Atlantic, Mediterranean, and from the Eurasian continent. Frequent periods of warming are associated with the inflow of mild Atlantic and Mediterranean air masses. They are typical of the southern and western regions. In winter, atmospheric phenomena such as fog, blizzards and ice can all appear; thunderstorms may occur along the cold fronts, in periods of warming.

Spring starts with the rise of mean daily temperatures above 0ºC. In Ukraine spring arrives earliest in Crimea, in the southwest and Transcarpathia in middle to late February. In the northern areas this occurs in the middle of March. The duration of the spring season varies between 50–55 days in the east and 70–85 days in the west of the country. The season lasts around 80 days in the foothills and slopes of the Ukrainian Carpathians and around 100 days high in the mountains. Increasing air temperatures are recorded following the snowmelt, i.e. in March, when they may rise up to 20ºC on the plains of Ukraine and reach 30ºC in Crimea. The spring season terminates in May with a rise in mean daily temperatures above 15ºC on the plains, but it mountain areas this typically occurs as late as June and early July.

Summer approaches in mid-May in most of Ukraine; in the beginning of May in the south, and later in the west and north. The beginning of summer is marked by a rise in mean daily temperatures above 15ºC and its imminent end is indicated by their decrease below this value in the first part of September. Solar radiation is a basic factor influencing climatic conditions, processes and resources during the summer period. The highest figures of radiation balance are recorded in June and overall, summer is moderately warm in Ukraine. Its duration is different in various regions of the country and lasts up to

100 days in the zone of mixed forests, 120–130 days in the steppe and 140–150 days along the coasts of the Black Sea and Sea of Azov. Mean temperatures are the highest in July, with absolute maxima of 38–40ºC, gradually decreasing from the south to the north, and from the west to the east. The highest values are typical of the southern and south-eastern regions (39–41ºC). The summer maxima of precipitation fall in June and July.

Autumn is imminent by mid-September and ceases by November with the drop in mean daily temperatures below zero. The season lasts 30–40 days, with a gradually reduction in the number of sunshine hours and an almost fourfold decrease of radiation balance, partnered with a simultaneous increase in the influence of atmospheric circulation upon the weather. Average temperature during the autumn season decreases rapidly by 4–8ºC from September to November, whereas the amount of precipitation is 45–55 mm in the north and ca. 20 mm in the south. Days are shortening and the influx of cold Arctic air masses becomes increasingly frequent. In the majority of the country, autumn ends in the third decade of November, but on the seaside of Crimea it terminates in late December.

Hazardous meteorological events are a frequent event in Ukraine and they can often have disastrous characteristics. In the cold period of the year, blizzards, frosts and fog are typical, whilst in the warm season extreme heat, dry winds, dust storms, heavy spells of rain, thunderstorms, squalls, spout and hail may occur. These phenomena are repeated year on year and affect areas of a variety of size.

For the time being, global processes have a real influence upon the climate of Ukraine. For example direct and total solar radiation have changed; air pressure has decreased in January and increased in July, winter temperatures have tended to increase and summer temperatures lowered. Further, the amount of precipitation has grown in the southeast and lessened in the northwest, extreme weather has become more frequent and there has been a general trend of the climate to turn milder.

Surface and subsurface waters. ***Surface waters*** include rivers, lakes, brackish lagoons (limans), water reservoirs, ponds, canals, swamps and marshes. There are 63,119 *rivers* and streams in Ukraine; of them 3,302 are longer than 10 km. The total length of watercourses exceeds 206 km. The number of small streams amount to 63,029 (99.9%) with a total length of 185,771 km. There are 59,817 watercourses shorter than 10 km number and their combined length is 112,181 km.

The hydrographic network of Ukraine almost entirely drains into the Black Sea, with the exception of the catchment of the Vistula (Wisła) which belongs to the Baltic Sea basin. The largest drainage systems are those of the Dnipro, Dnister, Southern (Pivdennyi) Buh, Danube, and Northern (Sivers'kyi) Donets' rivers. Most of the watercourses eventually empty into the Dnipro (27.7%), Danube (26.3%) and Dnister (23.7%).

Catchment areas of the largest rivers are divided among several natural zones. By area, most of the watersheds remain less than 50 km^2 (95.9%). Average density of the drainage network (km/km^2) on Ukraine's territory is 0.26 for the Dnipro, 0.60 for the Dnister, 0.35 for the Southern Buh, 0.22 for the Northern Donets' and 0.66 for the Danube.

Recharge of the watercourses is provided by snowmelt, rainfall and subsurface waters. For the rivers on the flatlands, snowmelt water is the basic source of replenishment (making up 50–80% of river flow). In the Carpathian and Crimean Mountains rainwater has a 20–25% contribution to river runoff. Recharge due to subsurface waters is typical of dissected uplands, where its share varies between 10–20%. The source of replenishment is decisive for the drainage regime of the rivers. Rivers on the plains are characterised by a high water stage and floods in spring; they experience a low water stage in summer; there is a slight rise in water level in autumn and a low stage during the winter. In the Ukrainian Carpathians floods may occur at any time of the year, whereas in Crimea they are typical of winter and spring-time.

Rivers in Ukraine transport a considerable amount of solid sediment. In the plains, the parameters of this bed-load depends on the natural zones they traverse: the annual average concentration of solid sediment varies between 20–50 g/m^3 in the forest zone and between 100–250 g/m^3 in forest steppe. In mountain areas, bed load may reach 1,000–4,000 g/m^3 (Carpathians). Also, the hydrochemical composition of lowland rivers has marked characteristic features in differing zones. In the mixed forest zone, hydro-carbonate–calcium waters prevail, whereas

in the forest steppe zone, waters of the hydrocarbonate class mix with calcium-magnesium, calcium-sodium and sulphate; in the steppe zone waters of the hydro-carbonate–sulphate class dominate. Hydrochemical composition of mountain watercourses as a rule show a hydrocarbonate–calcium character. Average mineralisation of mountain rivers and streams varies between 160–350 mg/l within the zone of mixed forests, 320–570 mg/l for the forest steppe and 700–1,000 mg/l for the steppe zone. Human acts are a main contributor to this extensive mineralisation, contamination being responsible for 2 to 43% of mineral substances in the rivers of the Dnipro–Donets region.

One of the largest Ukrainian rivers is the Dnipro (Russian: Dnieper, ancient names are Borisfen, Slavutich). Its total length is 2,201 km; of this 1,121 km falls in Ukraine and the watershed occupies 504 thousand km^2. The Dnipro catchment basin extends to three countries – Russia, Belarus and Ukraine. Six water reservoirs were constructed on the river, which have profoundly modified the initial natural hydrological characteristics. The Dnipro springs from the Valdai upland in Russia, and flows across the zone of mixed forests, forest steppe and steppe. Its largest tributaries are the Prypiat', Teterev, Ros, Tiasmyn, Bazavluk, Desna, Trubizh, Sula, Psel, Vorskla, Oril' and Samara rivers.

The Dnister (Russian: Dniester, ancient name Tiras) rises in the Ukrainian Carpathians, near the village of Vovche in L'viv oblast, and empties into the Dnister Lyman along the Black Sea in Odesa oblast. Its total length is 1,362 km of which 925 km flows in Ukraine. The catchment area is 72.1 thousand km^2. Most of its tributaries are to be found in the middle reaches: Zolota Lypa, Strypa, Seret, Zbruch, Smotrych, Ushytsia, Murafa.

The Southern (Pivdennyi) Buh (Russian: Yuzhnyi Bug, ancient name Gipanis) takes its source near the village of Kholodets in Khmel'nits'kyi oblast and empties into the Dnipro–Buh Lyman on the Black Sea. Total length is 806 km, the catchment area occupying 63.7 thousand km^2. The largest tributaries are the Sob, Syniukha, Inhul, Zhar and Kodyma rivers.

In the east of Ukraine, the Northern (Sivers'kyi) Donets' (Russian: Severskyi Donets) is the largest watercourse; this right-hand tributary of the Don drains to the basin of the Sea of Azov. Rising from the Central Russian Upland, with a total length of 1,053 km, it flows 700 km on the territory of Ukraine. The catchment area extends over 98.9 thousand km^2.

Eventually emptying into the Black Sea, only the lowermost reaches of the Danube (174 km) belong to the territory of Ukraine. The river is divided into three branches within its delta and the state border between Ukraine and Romania stretches along one of them (Kiliis'ke Dunai), at a length of 112 km. The rivers Tisa and Prut are the largest tributaries of the Danube.

There are around 200 thousand *lakes* in Ukraine; of them 43 have a surface-area of 10 km^2 or more. They are dispersed amongst various regions of the country and have differing genesis. The Shats'k lakes (or system of lakes) are in Volyn oblast, lying on the interfluve between the Western (Zakhodnyi) Buh and Prypiat' rivers; most of them are within the Shats'k National Park. The largest of them is Lake Svitiaz', and has a surface-area of 27.5 km^2. Most of these lakes are karstic formations. However there are also lakes on Volyn Polissia formed by fluvial processes.

In the southern part of the country, brackish lagoons (lymans) are frequently encountered. They came about by marine transgression into the river mouths. Lakes in this category are located within the Danube delta (of them Yalpuh is the largest with 149 km^2 surface-area), in the mouth of the Dnister, Dnipro, Southern Buh, etc., such as Kuialnits'kyi, Khadzybeis'kyi, Molochnyi and other lymans.

A group of salt lakes of karst origin are located within Donets'k oblast, around Slovians'k. Salt lakes are also found in Crimea, in its Krasnoperekopsk raion (Perekopsk lakes) and around the town of Yevpatoriia, used for curative purposes and salt extraction. There are a cluster of salt lakes on the Kerch Peninsula (Kerch Lakes), near the coast of the Black Sea and Sea of Azov, and have a high concentration of mineral salt of up to 40‰. In some lakes mud has curative effect.

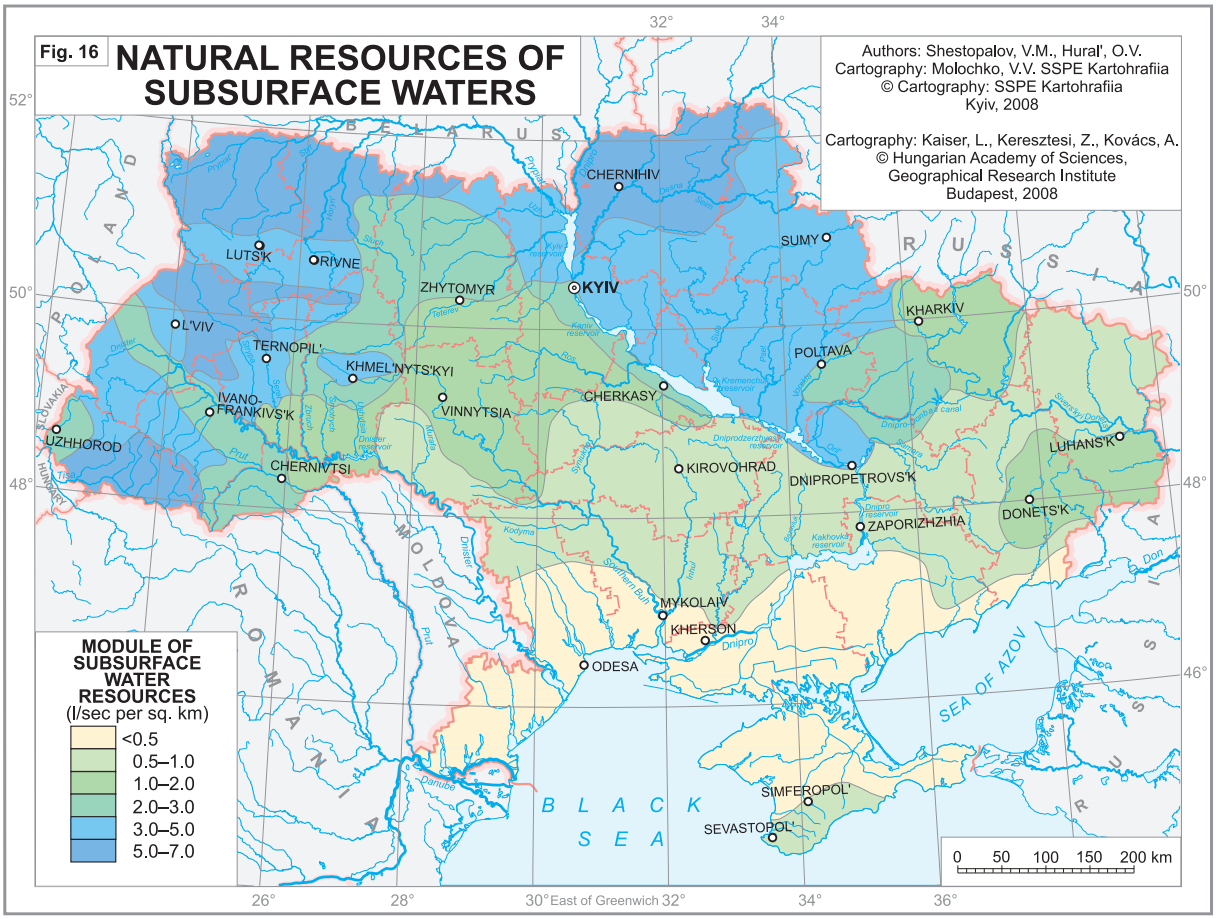
Of the mountain lakes, the dammed Lake Sinevir situated in the national park bearing the same name and Lake Brebeneskul' of glacial origin are notable (both in Transcarpathia).

In order to regulate river runoff, a system of artificial water bodies was constructed in Ukraine. There are 1,157 water reservoirs and 28,800 ponds and pools of non-uniform

distribution across the country. The largest reservoirs comprise the cascade on the Dnipro (Kyivs'ke, Kanivs'ke, Kremenchuks'ke, Dniprodzerzhins'ke, Dniprovs'ke, Kakhovs'ke) and one has been established on the Dnister (Dnistrovs'ke). Hydroelectric power plants operate on each of these reservoirs.

In the drainage basins of the Dnipro, Northern (Sivers'kyi) Donets' and Danube, *canals* were cut for water supply, irrigation, drainage and amelioration of cultivated land. The most important are as follows: North Crimean (Pivnichnokryms'kyi) Canal, Dnipro–Donbas Canal, Sivers'kyi Donets'–Donbas Canal, Kakhovs'kyi Canal, Dnipro–Kyvyi Rih Canal, and the Dnipro–Inhulets Canal.

Subsurface waters of Ukraine are freshwater resources widely used for consumption and an abundant supply of mineral waters (*Figure 16*). Freshwater resources are divided between several hydrogeological regions. Within the Ukrainian Shield they are to be found in the system of fissures in crystalline rocks and weathering products, and also in sedimentary rocks having formed in the Mesozoic and Cainozoic periods. These water resources are scanty and of non-uniform extension. The largest reservoir of subsurface freshwater reserves is the Dnipro artesian basin comprising systems of aquifers embedded in Paleozoic, Mesozoic and Cainozoic formations. This basin has an extremely deep (between 300–800 m) zone of freshwaters. The Volyn–Podillian artesian basin includes a system of aquifers associated with Proterozoic, Paleozoic, Mesozoic, and Cainozoic deposits. The depth of these freshwater zones varies between 5–100 m. The artesian basin along the Black Sea includes freshwater stored in Cretaceous, Paleogene, Neogene and Quaternary deposits. These sources are characterised by a variability in the degree of mineralisation, and a presence of brackish and salt waters. The Donets artesian basin features aquifers in Carboniferous, Permian, Jurassic, Cretaceous and Quaternary rocks and sediments. Freshwater and water with a low salinity can be traced down to a depth of 500 m below the surface. The Ciscarpathian artesian basin is fed from the Quaternary horizon only. Other subsurface aquifers of the region are mineralised to a very large extent. Subsurface



waters in Crimea are associated with Taurian formation, Cretaceous and Paleogene, although aquifers have a low yield.

Mineral waters in Ukraine are highly varied with respect to their composition. Most important are those with hydro-carbonate, radium, sulphide (enriched with organic substance), boron, siliceous, arsenic, bromine, iodum, polymetallic, and an iron content. They are stored in aquifers of different depth in diverse geological formations, and have a broad range of balneological utilisation.

The Black Sea and Sea of Azov are actually inland seas, belonging to the system of the Atlantic Ocean, and lap at the coasts of Ukraine, Russia, Georgia, Turkey, Bulgaria and Romania. The Black Sea is connected to the Mediterranean Sea through the Bosporus, Sea of Marmara and Dardanelles, and linked to the Sea of Azov by the Kerch Strait. West to east, the width of *Black Sea* is 1,167 km, and its north to south span equals 624 km. It has a surface-area of 422,000 km^2. Depth is 1,300 m on average, reaching a 2,250 m maximum. The continental shelf occupies ca. 25% of the seafloor and is 200–250 km wide at the coast of Ukraine. Crimea is the biggest peninsula, whilst the largest bays are Karkinits'ka, Kalamits'ka, Feodosiis'ka, Yahorlits'ka, Dzharylhats'ka.

The surface water has an average salinity of 18‰, which is slightly higher than that of half the world's oceans. It contains oxygen and a thick layer of hydrogen sulphide. The water balance of the Black Sea is maintained by freshwater transported by the entering Danube, Dnipro and Rioni rivers and by the bottom currents enabling an inflow of seawater through the Bosporus. The temperature of the upper layers can reach 23–26ºC in summer, and drops to 6–9ºC in the winter; it stabilises at a depth of 150 m at 9ºC. Ukraine's most important harbours are located on the Black Sea coast: Odesa, Illichivs'k, Pivdennyi (Yuzhne), Mykolaiv, Sevastopol', Yalta and Feodosiia. Nature reserves are also located here: Black Sea Biosphere Reserve, Danube, Karadag and Mis Mart'ian.

The *Sea of Azov's* coastline stretches some 2,686 km, half of which belongs to Ukraine and the rest a part of Russia. Arabatska Strilka (isthmus) divides the Bay of Syvash from the Sea of Azov. The watercourses of the Lozuvatka, Obytichna, Berda and Kal'mius empty into the sea arriving from Ukraine, whereas the Don, Yeia, Chelbas, Beisug and Kuban' flow from Russia. The temperature of the upper layers reaches 24–25ºC in summer and it cools down to -1ºC during the winter when its northern parts are covered with ice. The Sea of Azov is an important waterway, with major seaports of Mariupol' and Berdians'k (Ukraine); Rostov-na-Donu and Taganrog (Russia).

Around 30% of offshore hydrocarbon reserves are located in the Ukrainian sector of the Black Sea and Sea of Azov. These deposits of natural gas and condensate of the continental shelf have been exploited at eight fields in the Black Sea and at six in the Sea of Azov.

Commercial fishing is an important sector of the national economy and the catch includes some highly valuable species. Various natural recreational resources are concentrated in the coastal strip of the Black Sea and Sea of Azov.

Water resources of the country include surface, subsurface and marine waters. Potential water resources are estimated at 209.8 km^3. Only one quarter of this quantity is derived on Ukraine's territory. The country as a whole has a poor water supply, with respect to the combined river and local runoff. Surface flow of the largest rivers is 95.2 km^3 and based on an annual average, amounts to a mere 1,000 m^3/yr per capita. Water balance for subsurface water resources are estimated at 21.0 km^3/yr and the total underground runoff amounts to 500–550 m^3/sec. The volume of subsurface waters figuring in the water management budget statistics of the country, is 7.0 km^3. 1.0 km^3 of sea water is also used for various purposes.

Soils. Soil cover in Ukraine is a complex formation, being a function of the soil- forming parent rock, relief, climate and hydrological-morphological conditions (*Figure 17*). There is a pronounced latitudinal zonality over the plains with changing soil properties from the north–northwest towards the south–southeast, whereas vertical zonality is typical in the mountains. In the plains, there are sod-podsolic and grey forest soils; chernozems; chestnut; meadow soils, meadow chernozems and bog soils; solonchaks, solonetzes and solods. 65% of the soil in cultivated lands are chernozems, whilst grey forest soils make up 17%, sod-podsolic soils 7%, chestnut soils 4%, and other soils 8%.

*Chernozem*s in Ukraine are represented by variations: podsolised, typical and ordinary chernozems. They have predominantly formed

on loess and loess-like deposits and are encountered mainly in forest steppe and steppe zones. The depth of the humified layer is 70–120cm, humus content in the upper horizon fluctuates between 3.5 and 6.5%. Hydrophysical characteristics are favourable for the cultivation of the land. In the subzone of dry steppes, i.e. in the northern part of the region along the Black Sea coast and in the southern areas of the Crimean plain, the so-called southern chernozems are encountered. Their humified layer is 50–55cm thick with 3–4% humus content in the uppermost horizon. Solonetz chernozems often form on saline clays; they have lower humus content and less favourable hydrophysical and physicochemical properties. Chernozems in Ukraine are suitable for the cultivation of a great majority of agricultural plants.

Sod-podsolic soils are typical of sandr, moraine-sandr and alluvial plains, and in some parts of the forested terraces in the forest steppe and steppe zones. The depth of humified eluvial horizon is 18–22cm with 0.7–2.0% humus content. These soils can be subdivided into weak, medium and heavily podsolised, and can be categorised by water regime into automorphous, surface-gleyed and deeply-gleyed varieties. They produce an acid reaction of soil solution and are slightly saturated with basics. Sod-weakly podsolised sand and loamy sand soils are frequently encountered in Polissia, and sandy variations are associated with the eolian kuchugur uplands. They have a thin humified horizon, a low humus content (0.6–0.9%), a low capacity to absorb and store moisture and they are poor in nutrients. Nevertheless, using suitable farming technology they give fairly good yields of winter rye and potatoes.

In the uplands of Ciscarpathia, with its abundant atmospheric precipitation (above 700 mm annually) and medium and heavily podsolised gleyed sod soils, there is a need for regulation of the water regime, liming, and an application of fertilisers.

Second to chernozems, the most frequently encountered soils in the forest steppe zone are *light-grey, grey* and *dark-grey podsolised soils.* As a rule, they cover watershed plateaus, and in Polissia, loess isles. These soils are poor in nutrients and their physical properties are also inferior. Gleyed variations of podsolised soils form on loess-like deposits with a high underground water table (2–3 m).

Dark-chestnut residual solonetz soils are mainly to be found in the southern (dry) steppe subzone, predominantly on loess. Their profile reaches 50–55cm and a humus content of 2.5–3.0%.

Sod-clayey soils are associated with low-lying elements of topography such as watersheds and terraced plains in the mixed forest and forest steppe zones. They form in conditions of excess moisture supply, under grassy vegetation and contain 1.5–5.0% humus. Sod-alkali or solodised soils develop in the event of a salinisation of underground waters with soluble salts.

Sod-skeletal soils are weakly developed soils of an undifferentiated profile; they are encountered in the zone of crystalline rock outcrop of the Ukrainian Shield, have 2–3% humus content and are to be found under woodland. *Sod-forest soils* form on fluvial terraces originally covered by woods, in all natural zones. Amelioration is a basic precondition of their use for purposes of agricultural production.

Sod-carbonate soils form in the western part of the zone of mixed forests, with outcrops of chalk and marl. These are the most fertile soils in Polissia; they are either cultivated or found under woodland.

Meadow chernozem soils are encountered on terraces covered with loams developed on loess, in the forest steppe and steppe zones. They have fairly high humus content (6–8%) and are saturated with calcium and magnesium. *Meadow solonetz chernozem* variations are also widespread. In the northern forest steppe, salinisation is sodic in character, whilst in the southern portion it is of a sulphate nature. In the steppe zone, it is of a chloride-sulphate type.

Peaty soils and *bog-marsh* have developed in the floodplains of rivers and other depressions experiencing poor drainage in Polissia.

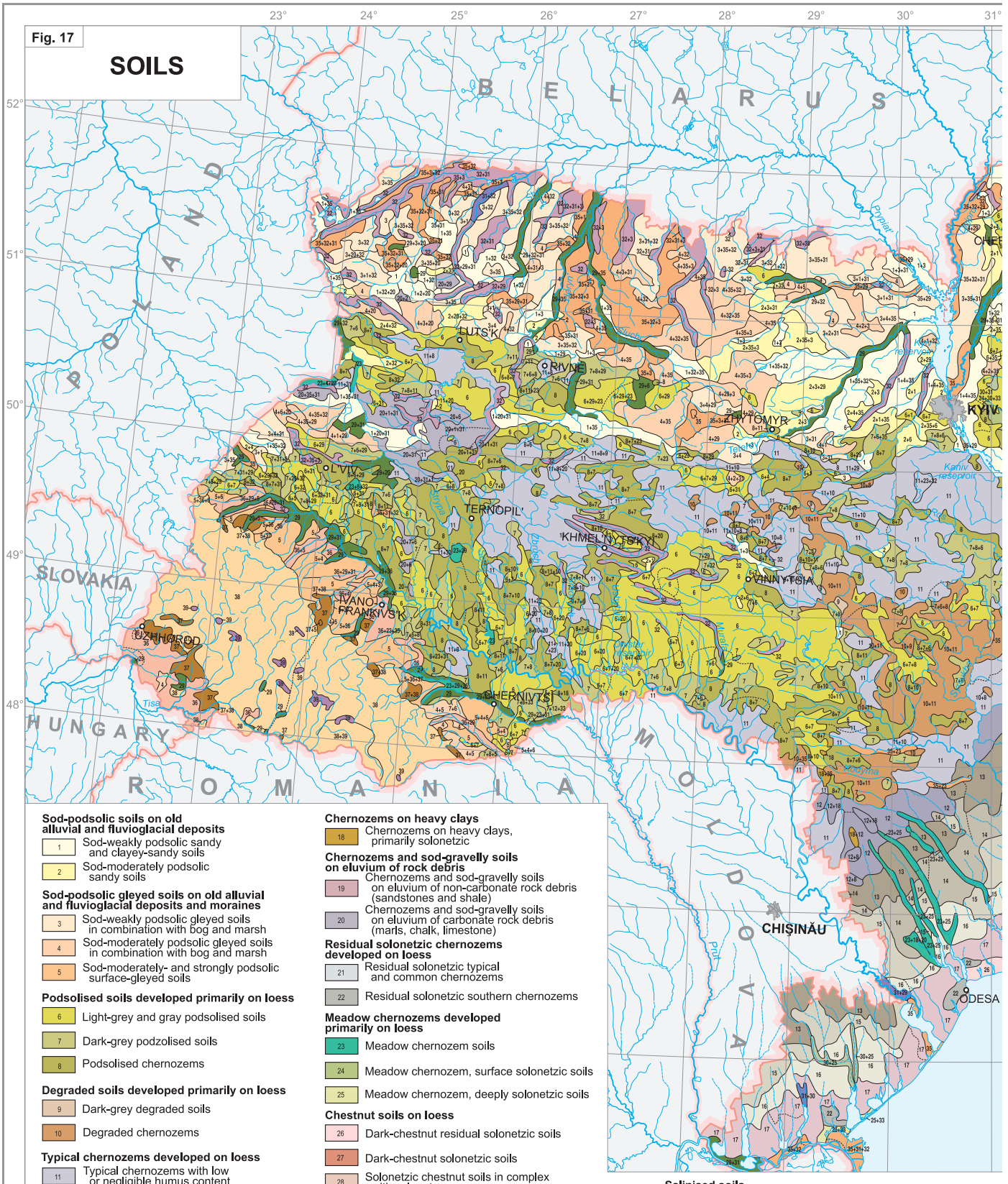
In the region of the Bay of Syvash and on the Kerch Peninsula (both in Crimea), along with the terraces of the Dnipro and other southern rivers, *solonetz soils* of low fertility are to be found.

In minor depressions (*pod*) of the steppe, *solodised soils* are encountered and are unsuitable for farming.

The Ukrainian Carpathians and Crimean Mountains display a marked vertical zonality in the soil cover. In the Ukrainian part of the Pannonian Lowland (Transcarpathian plain) *sod-*

Fig. 17

SOILS



Sod-podsolic soils on old alluvial and fluvioglacial deposits

1 Sod-weakly podsolic sandy and clayey-sandy soils

2 Sod-moderately podsolic sandy soils

Sod-podsolic gleyed soils on old alluvial and fluvioglacial deposits and moraines

3 Sod-weakly podsolic gleyed soils in combination with bog and marsh

4 Sod-moderately podsolic gleyed soils in combination with bog and marsh

5 Sod-moderately- and strongly podsolic surface-gleyed soils

Podsolised soils developed primarily on loess

6 Light-grey and gray podsolised soils

7 Dark-grey podzolised soils

8 Podsolised chernozems

Degraded soils developed primarily on loess

9 Dark-grey degraded soils

10 Degraded chernozems

Typical chernozems developed on loess

11 Typical chernozems with low or negligible humus content

12 Typical chernozems with medium humus content

Common chernozems developed on loess

13 Deep common chernozems with low or medium humus content

14 Common chernozems with medium humus content

15 Common chernozems with low humus content

16 Shallow common chernozems with low humus content

Southern chernozems developed on loess

17 Southern chernozems with low or negligible humus content

Chernozems on heavy clays

18 Chernozems on heavy clays, primarily solonetzic

Chernozems and sod-gravelly soils on eluvium of rock debris

19 Chernozems and sod-gravelly soils on eluvium of non-carbonate rock debris (sandstones and shale)

20 Chernozems and sod-gravelly soils on eluvium of carbonate rock debris (marls, chalk, limestone)

Residual solonetzic chernozems developed on loess

21 Residual solonetzic typical and common chernozems

22 Residual solonetzic southern chernozems

Meadow chernozems developed primarily on loess

23 Meadow chernozem soils

24 Meadow chernozem, surface solonetzic soils

25 Meadow chernozem, deeply solonetzic soils

Chestnut soils on loess

26 Dark-chestnut residual solonetzic soils

27 Dark-chestnut solonetzic soils

28 Solonetzic chestnut soils in complex with solonetzes

Meadow soils developed on deluvial and alluvial deposits

29 Meadow soils

30 Meadow solonetzic soils

Bog soils on alluvial, deluvial, and fluvioglacial deposits

31 Meadow-bog and swamp soils

32 Peatland and peat-bog soils

Solonetzes

33 Solonetz soils, primarily of solonchak type

Salinised soils

34 Meadow chernozem and sod-salinised gley soils and solods

Sod soils

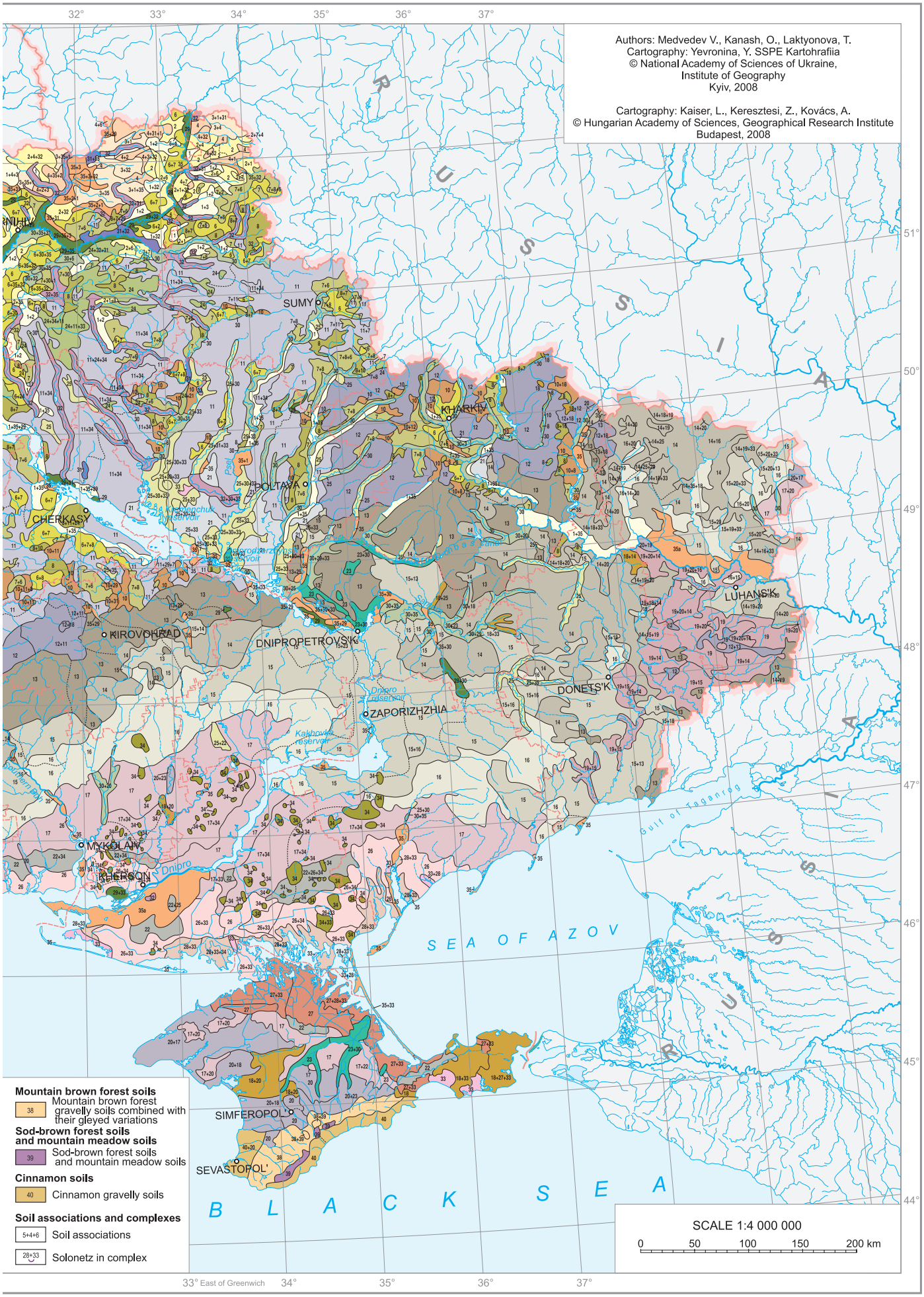
35 Gleyed sod soils primarily developed on sand, clayey sand and sandy loam, in complex with sands of weak humus content

35a Non-gleyed sod soils primarily developed on sand and clayey sand, in complex with sands of weak humus content, occasionally with kuchugur (hummocky) relief and sandy chernozems

36 Podsolised sod-loamy soils and their gleyed variations

Podsolic brown forest soils primarily on deluvial deposits

37 Podsolic brown forest soils and their surface gleyed variations


Authors: Medvedev V., Kanash, O., Laktyonova, T.
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MYKOLAIV
KHERSON
SIMFEROPOL'
SEVASTOPOL'
SEA OF AZOV
BLACK SEA
Gulf of Taganrog
Dnipro reservoir
Kakhovka reservoir
Mountain brown forest soils
38 Mountain brown forest gravelly soils combined with their gleyed variations
Sod-brown forest soils and mountain meadow soils
39 Sod-brown forest soils and mountain meadow soils
Cinnamon soils
40 Cinnamon gravelly soils
Soil associations and complexes
5+4+6 Soil associations
28+33 Solonetz in complex
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gley soils are found; the foothills harbour *sod-podsolic* and *surface-gleyed soils; podsolised brown forest soils* and *surface-gleyed soils* are found on the piedmonts of the volcanic range; and *mountain brown forest soils* and *sod-brown forest soils* in the mountainous areas of the Carpathians, developed on eluvial-deluvial deposits under woodland and grassland.

In the Crimean forest zone, on the northern aspect slopes at altitudes over 300 m, and on southern aspects over 400–600 m, *mountain brown forest soils* and *sod-brown forest soils* are to be found. Their humus content varies between 4 and 6%. In the lower parts of the slopes of the main ridge of the Crimean Mountains, *stony cinnamon mountain soils* are found up to an altitude of 400–600 m. The soils of Crimea are under intense cultivation: valuable berries, grapes, oil-seeds and tobacco are grown.

Vegetation. As far as its present-day vegetation is concerned, nature has richly endowed Ukraine, and the country occupies a prominent place in Europe. Due to its unique geographical location, Ukraine was the venue of the formation of florocomplexes and coenocomplexes which were derivatives from various centres.

Flora of superior and inferior plants includes more than 25 thousand species, in addition to over 40 domesticated species. The territory of Ukraine harbours several differing environments for plants: forests, steppes, meadows, swamps and aquatic vegetation in lakes and reservoirs. Natural vegetation occupies ca. 30% of the country's territory, even though it has undergone intense human-induced transformation. Going from the west to the east, i.e. from the Central European province to the East European one, a strengthening Continental climate can be observed. From the north to the south, with the improvement in climatic conditions the broad-leaved, forest steppe, steppe and Sub-Mediterranean zones follow each other.

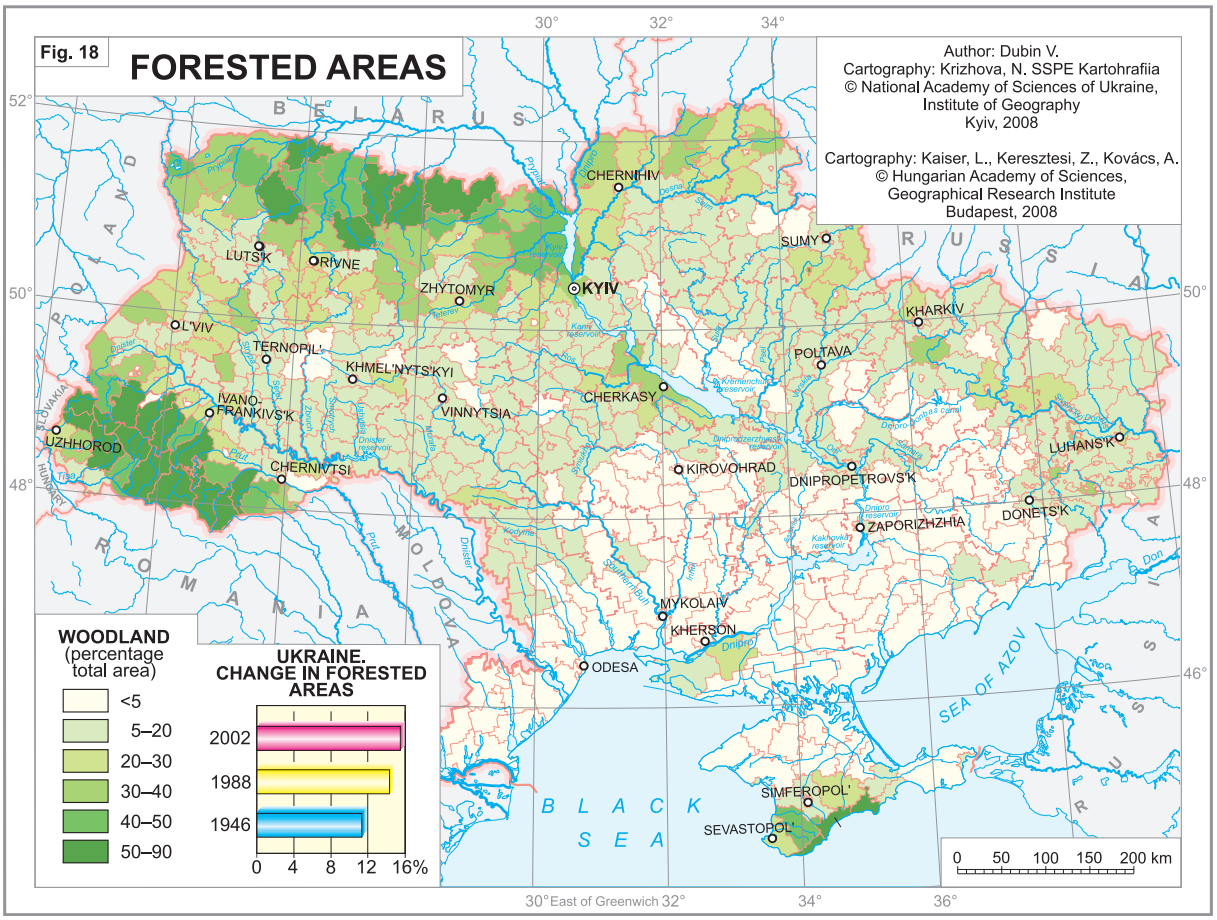
The forest zone is represented by Central European, East European and Carpathian-Alpine geobotanical provinces, whereas the forest steppe zone includes Pannonian, Ukrainian and Central Russian geobotanical provinces.

Typical forests in Ukraine are: bor (pine grove), subor, sugrudok, grud (oak–hornbeam forests), dubrava, buchina (beech grove), ramen' and suramen'. Woodland occupies 15.9% of the country's territory (*Figure 18*). The basic species are pine, spruce, fir, larch, beech, oak, hornbeam, elm, linden, ash, maple, birch, poplar and alder. In the zone of mixed forests and on the sandy terraces of forest steppe, common pine is the most widespread. In the Ukrainian Carpathians pine groves are scarce, whereas in the Crimean Mountains they reach up to 1,000–1,300 m. Spruce (common i.e. European and mountain) is less frequent here, but in the Carpathians they expand up to 1,450–1,650 m. In the latter, and in Roztochchia, fir is frequently encountered. Beech is widespread: European beech grows at altitudes of 500–1,200 m in the Carpathians and Taurian beech is found up to 1,300 m in the Crimean Mountains. Beech groves occupy the plateaus in Podillia as mixed forests, with abundant hornbeam, ash, maple, and linden. On the Ukrainian plains and in the mountains up to 900 m, common oak and rocky oak are to be found. Fluffy oak grows in the Crimean Mountains. Oak groves are typical of the forest steppe zone, the piedmonts of the Carpathians and the plains of Transcarpathia. Hornbeam–oak forests are found on the right bank forest steppe zone, in the following composition: common oak, common hornbeam, ash, heart-leaf linden, maple, elm, birch and black alder. In the mixed forest zone there are birch forests, also occurring in some places within the forest steppe and steppe zones. Bearded birch dominates, mixed with pine, oak and hornbeam. On the flood plains below river terraces and with bog soils, the dominant species are black alder mixed with pubescent birch, common pine, oak and hornbeam.

Steppe vegetation is represented in the forest steppe and steppe zones by grassy vegetation such as feather-grass, fescue-grass and clover. Grasses dominate in a typical steppe environment. Steppes mainly composed of fescue and feather-grass, survive in the Askania-Nova nature reserve and in Crimea. Sagebrush-fescue steppes (feather-grass, fescue and wheat-grass) are to be found along the coastal plains of the Black Sea and Sea of Azov, and in the vicinity of the Bay of Syvash and Kerch Peninsula. Categorised by location, meadow vegetation is subdivided into flood-plain, dry valley, lowland and mountain meadows.

Three types of swamps are encountered in Ukraine: eutrophic swamps, mesotrophic (transitory) bogs and oligotrophic (high) moors.

Human impact caused by economic activities, has resulted in a considerable shift towards the retreat of wild plants and plant communities,



along with the appearance of a great amount of adventive species, alien to natural phytocoenoses and contaminating the genetic fund.

The conservation of the diversity in flora is one of the current tasks in Ukraine. Presently, 541 plant and mushroom species needing protection are recorded in the Red Book of Ukraine and the Green Book of Ukraine contains 127 syntaxa, i.e. plant communities of different ranks with a relevant protection regime.

Animal wildlife. The number of species that exist in Ukraine are witness to the abundance and diversity of fauna. There are 117 mammals, 400 birds, around 200 types of fish, 21 reptiles, 17 amphibia, 20 crustaceans, ca. 25 thousand insects, etc. The combined total of differing animal species is estimated to be 44,000.

Over half of the country's territory belongs to the Holarctic region, and within that to the boreal European–Siberian zoogeographic subregion. The Crimean Mountains, the southern coast of Crimea and Pannonian lowland are part of the Mediterranean–Central Asian zoogeographic subregion, similar to the fauna of continental standing waters, Black Sea and Sea of Azov.

The following animals are encountered in almost all Ukrainian biotopes.

Mammals: common hedgehog, mole (with the exception of the steppe and Crimean Mountains), shrew (common, pygmy, white-toothed and lesser), bat particoloured, brown hare, common rat, mice (common field-mouse and door mouse), hamster, common vole, common red fox, wolf, raccoon dog, stone marten, badger and wild boar.

Birds: great crested gebe, common heron, mallard, garganey, kestrel, quail, corncrake, black-headed gull, turtle-dove, cuckoo, black swift, woodpecker, sky lark, house sparrow and tree sparrow, raven, hooded crow, magpie, rook, great tit, thrush nightingale, yellow bounting, starling, sand martin and swallow.

Reptiles: sand lizard, grass snake and smooth snake.

Amphibia: marsh frog, pool frog (except for Crimea), Altai brown frog (except for the dry steppe), tree frog, toad and common toad (except for Crimea and the arid steppe).

In biotopes that have suffered profound change as a result of human impact, mammal

species such as mice and the grey hamster are frequently encountered, along with widespread birds such as kite, partridge, great bustard, crane, skylark, wagtail and corn bunting.

Rare species of mammals and those on the verge of extinction, entered into the Red Book of Ukraine are stoat, southern birch mouse, long-eared hedgehog, desman, alpine shrew, horseshoe bat (greater and lesser), noctule (lesser and giant), mountain hare, European souslik, great jerboa, European mink, wild cat, lynx and bison. Fish that appear in the Red Book are: sturgeon (sterlet, great white sturgeon), salmon and trout (salmon-trout, Danube trout and European grayling). Bison, wild boar (Central Asian and Far Eastern subspecies), mountain hare, rabbit, muskrat, and the red squirrel belong to the acclimatised and re-acclimatised animal species. The most frequently hunted animals are the wild boar, moose elk, red deer, European roe-deer, brown hare and the common red fox. Their stock has lessened recently.

Landscape diversity and physico-geographical subdivision of Ukraine. The main components of the natural environment characterised above (relief, climate, waters, soils, flora and fauna) are in a state of permanent interrelationship and interaction, thus forming geographical landscapes which represent natural territorial complexes and intricate geosystems.

During the last decades of the 20^{th,} and early 21st century, geographical science has paid increasing attention to the study of landscapes and their components and complexes, including those within Ukraine (*Figure 19*). This can primarily be attributed to the practical relevance of the use of natural resources and ecological problems that have recently emerged.

Large-scale investigations into the morphology, geophysics and geochemistry of landscapes have been performed, landscape mapping and classification has been accomplished, and methodological and applied issues have come to the fore. Further, physico-geographical subdivision of the country's territory was carried out, into regions and administrative units (raions). A series of publications and landscape maps have been compiled with respect to applied problems, related to agriculture and sylviculture, regional planning, and also to the solution of radio-ecological issues in the aftermath of the Chernobyl' nuclear disaster.

A characteristic feature of Ukrainian natural territorial complexes is their landscape-typological diversity and intricate spatial pattern. This is a consequence of: the country's location within three physico-geographical macroregions (East European Plain, Ukrainian Carpathians, Crimean Mountains) and four latitudinal zones; a specific vertical zonality in the mountains; a complex geological build-up (the presence of different geostructures and formations from various geological times); spatial differentiation of recent crustal movements; the origin of landscapes, i.e. an inheritance of relic landscapes from ancient glaciations; and a perpetual transformation of natural landscapes under the impact of human activity.

The East European Plain is dominated by plain landscapes occupying over 94% of the country's territory, whereas mountainous landscapes are typical of the Ukrainian Carpathians and Crimean Mountains. Zonality is a primary characteristic feature of plain landscapes. Examples of various natural zones of the Earth's temperate belt are found in Ukraine: mixed coniferous–decidious forests, broad-leaved forests, forest steppes and steppes. Major factors decisive in the types of zonality are heat, moisture balance and the parent rocks the soils have been formed upon.

Recently, Ukrainian geographers have come to the conclusion that broad-leaved forests in the west of the country are the continuation of a similar kind of woodland zone extending from western Europe.

Mountainous landscapes occupy over 5% of the country's territory and the distribution shows a vertical zonality. In the Ukrainian Carpathians forests prevail: Oak is dominant on the foothills; a prevalence of beech on low mountains; fir mixing with beech and meadow landscapes on middle mountains; pine with shrubs at the sub-alpine level; and grass vegetation with shrubs at alpine level.

Examining the landscape structure of the Crimean Mountains, forest–meadow landscapes can be observed with mixed coniferous–deciduous forests, karst landscapes on the yaila, and subtropical landscapes of a Mediterranean type along the southern coasts.

A fundamental principle of classification and typology in modern landscape science is an approach which considers the genesis of a landscape as the first step, further taking into account geophysical and geochemical properties, and current physico-geographical processes.

Fig. 19

LANDSCAPE TYPES

Authors: Marynych, O., Petrenko, O.
Cartography: Krizhova, N.
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Kyiv, 2008

Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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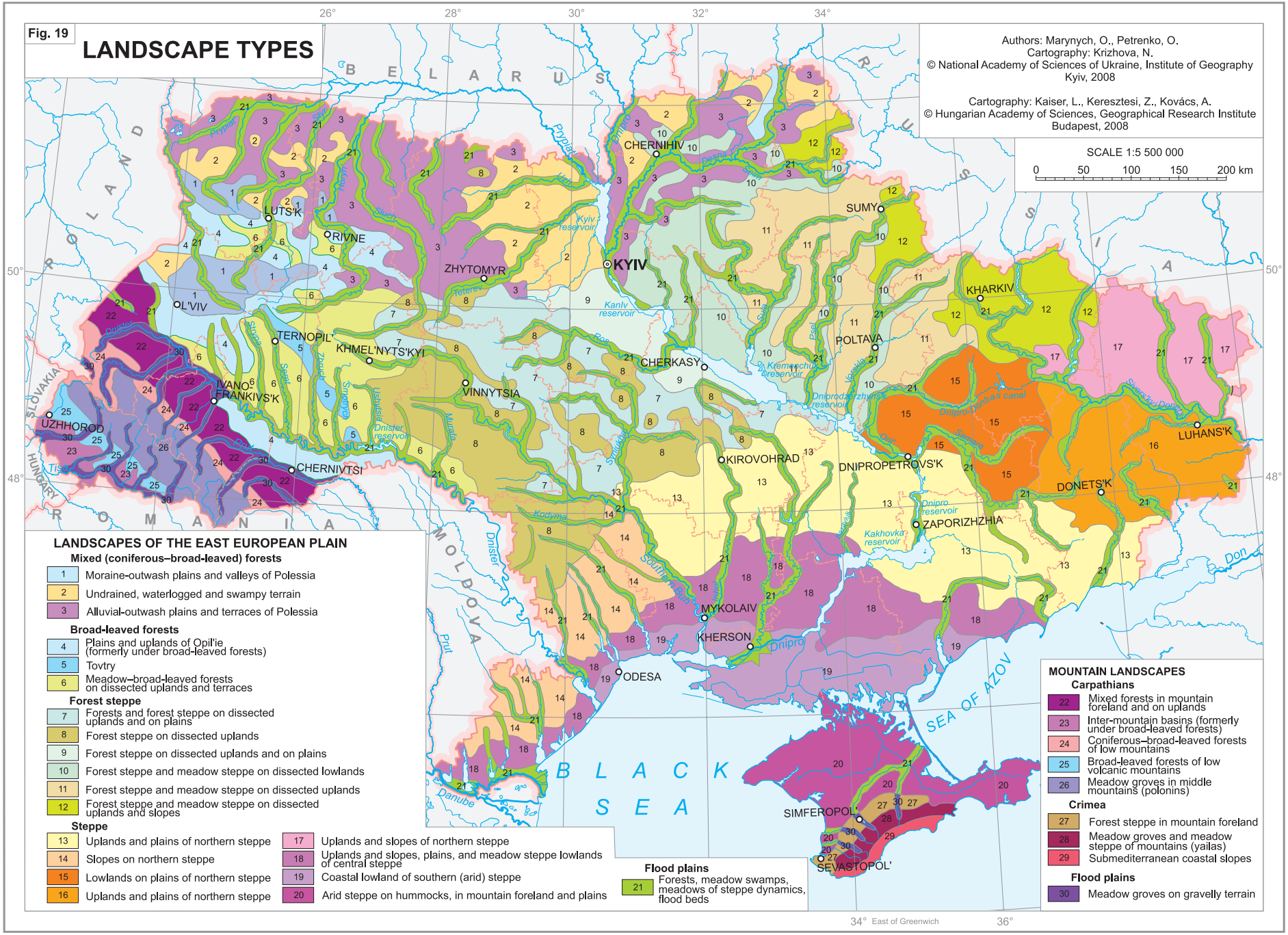


LANDSCAPES OF THE EAST EUROPEAN PLAIN

Mixed (coniferous–broad-leaved) forests

1 Moraine-outwash plains and valleys of Polessia
2 Undrained, waterlogged and swampy terrain
3 Alluvial-outwash plains and terraces of Polessia

Broad-leaved forests

4 Plains and uplands of Opil'ie (formerly under broad-leaved forests)
5 Tovtry
6 Meadow–broad-leaved forests on dissected uplands and terraces

Forest steppe

7 Forests and forest steppe on dissected uplands and on plains
8 Forest steppe on dissected uplands
9 Forest steppe on dissected uplands and on plains
10 Forest steppe and meadow steppe on dissected lowlands
11 Forest steppe and meadow steppe on dissected uplands
12 Forest steppe and meadow steppe on dissected uplands and slopes

Steppe

13 Uplands and plains of northern steppe
14 Slopes on northern steppe
15 Lowlands on plains of northern steppe
16 Uplands and plains of northern steppe
17 Uplands and slopes of northern steppe
18 Uplands and slopes, plains, and meadow steppe lowlands of central steppe
19 Coastal lowland of southern (arid) steppe
20 Arid steppe on hummocks, in mountain foreland and plains

Flood plains

21 Forests, meadow swamps, meadows of steppe dynamics, flood beds

MOUNTAIN LANDSCAPES

Carpathians

22 Mixed forests in mountain foreland and on uplands
23 Inter-mountain basins (formerly under broad-leaved forests)
24 Coniferous–broad-leaved forests of low mountains
25 Broad-leaved forests of low volcanic mountains
26 Meadow groves in middle mountains (polonins)

Crimea

27 Forest steppe in mountain foreland
28 Meadow groves and meadow steppe of mountains (yailas)
29 Submediterranean coastal slopes

Flood plains

30 Meadow groves on gravelly terrain

34° East of Greenwich
36°

Human activity has had a major impact on changes in the composition of natural landscapes over the course of Ukraine's history. Farming, sylviculture, amelioration measures, various industrial activities (with a special reference to mining), the emergence of settlements, hydrotechnical construction, and the development of transport networks, recreational facilities and warfare have caused the most significant and far-reaching effects. Landscapes that have remained intact, or have been transformed only slightly occupy some 15–20% of the country's territory.

The classification of landscapes reflects an overall view of the basic components of the natural environment: relief and landforms, climatic conditions, soil cover and the characteristic features of natural vegetation.

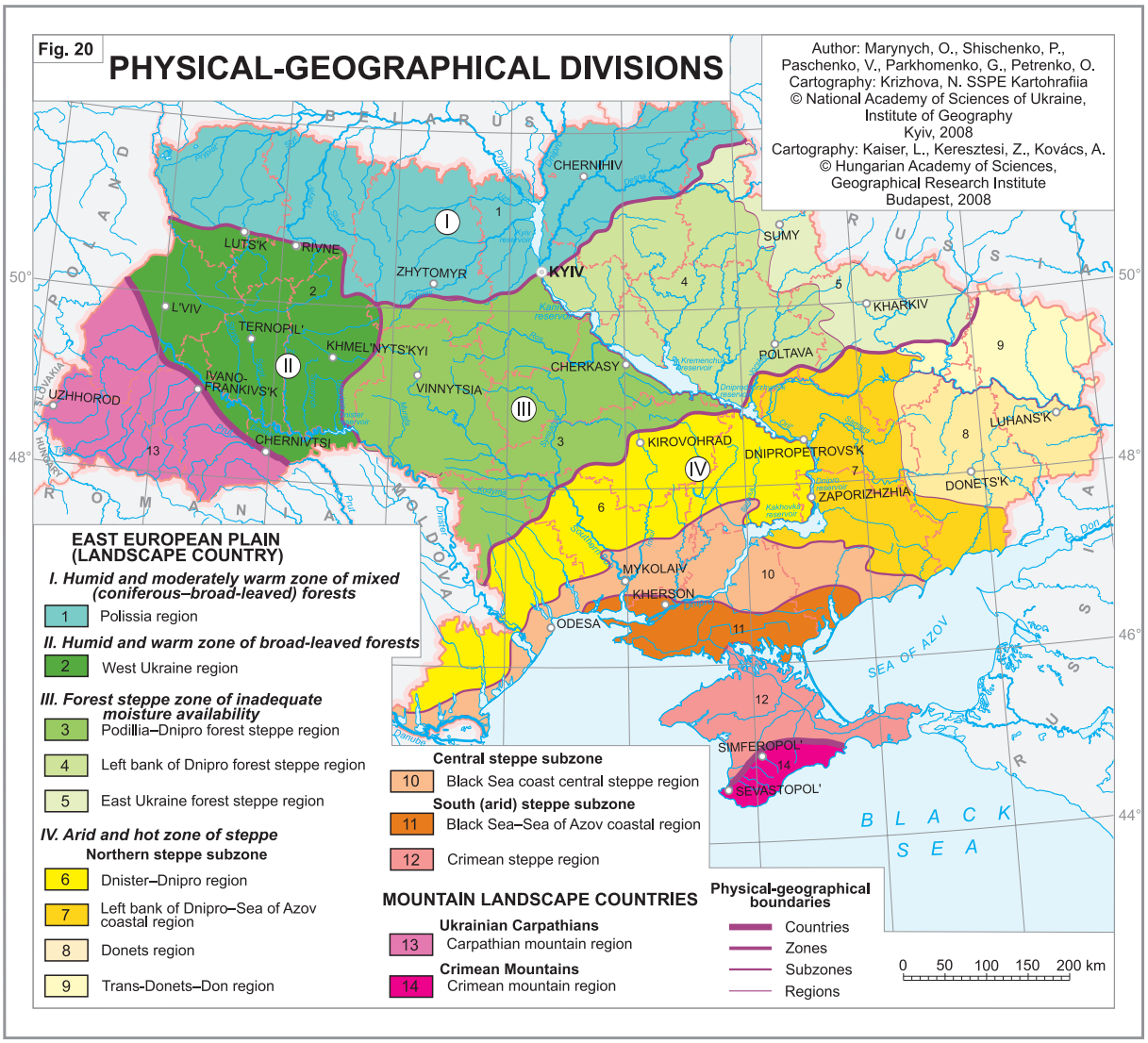
The results of the recent subdivision exercise show that there are 206 landscape units (*Table 2*) across the country. An integrated study of landscapes and their mapping served as a basis for the identification of physico-geographical raions, reflecting spatial differentiation and allowing subdivision into actual landscape units. The subdivision into raions has an importance for the accomplishment of a rational and balanced use of landscapes in practice. A landscape-genetic principle is inherent in the basis of raion demarcation, taking into consideration the differentiation of basic components of the natural environment. On *Figure 20*, the boundaries of zonal landscape units (zones and subzones) and those of the taxonomic units (macroregion and region) are shown. Territorial units are closely related to typological entities. Macroregions correspond to landscape classes; zones and subzones are the counterparts of types and subtypes. On the map showing physico-geographical subdivision, there are 3 macroregions, 4 zones, 3 subzones and 14 regions.

Ecological situation. The assessment of the living conditions of population is considered an integral part of environmental evaluation, most often regarded from the economic aspect as an impact of interactions between society and nature. Actually it is the synergetic representation of the cumulative impact of all kinds of technogeneous pressure on the landscapes. When performing a synergetic assessment of living conditions, beside the occurrence of polluted natural components, some other aspects also should be taken into account. Natural hazards, heat and moisture availability, duration of the frost-free period etc. might have a direct or indirect effect on ecological situation.

For a long time the ecological consequences of economic development had not been realised or had been ignored by the states all over the world. This negative approach had led to dramatic deterioration of the quality of the physical environment, pollution or contamination by

Table 2. ***Distribution of landscape units within physico-geographical zones and regions of Ukraine***

Physico-geographical macroregion	Physico-geographical zone	Physico-geographical region	Number of landscape units
East European Plain	1. Mixed forests	1. Polissia	31
	2. Broad-leaved forests	2. West Ukraine	16
	3. Forest steppe	3. Podillia–Dnipro	22
		4. Left Bank of Dnipro	12
		5. East Ukraine	14
	4. Steppe	6. Dnister–Dnipro	9
		7. Left Bank of Dnipro and Coast of Sea of Azov	13
		8. Donets	10
		9. Trans-Donets–Don	8
		10. Black Sea coast	16
		11. Coast of Black Sea and Sea of Azov	12
		12. Crimean steppe	11
Mountains	Vertical zonality	13. Ukrainian Carpathians	21
		14. Crimean Mountains	11
Total	4	14	206

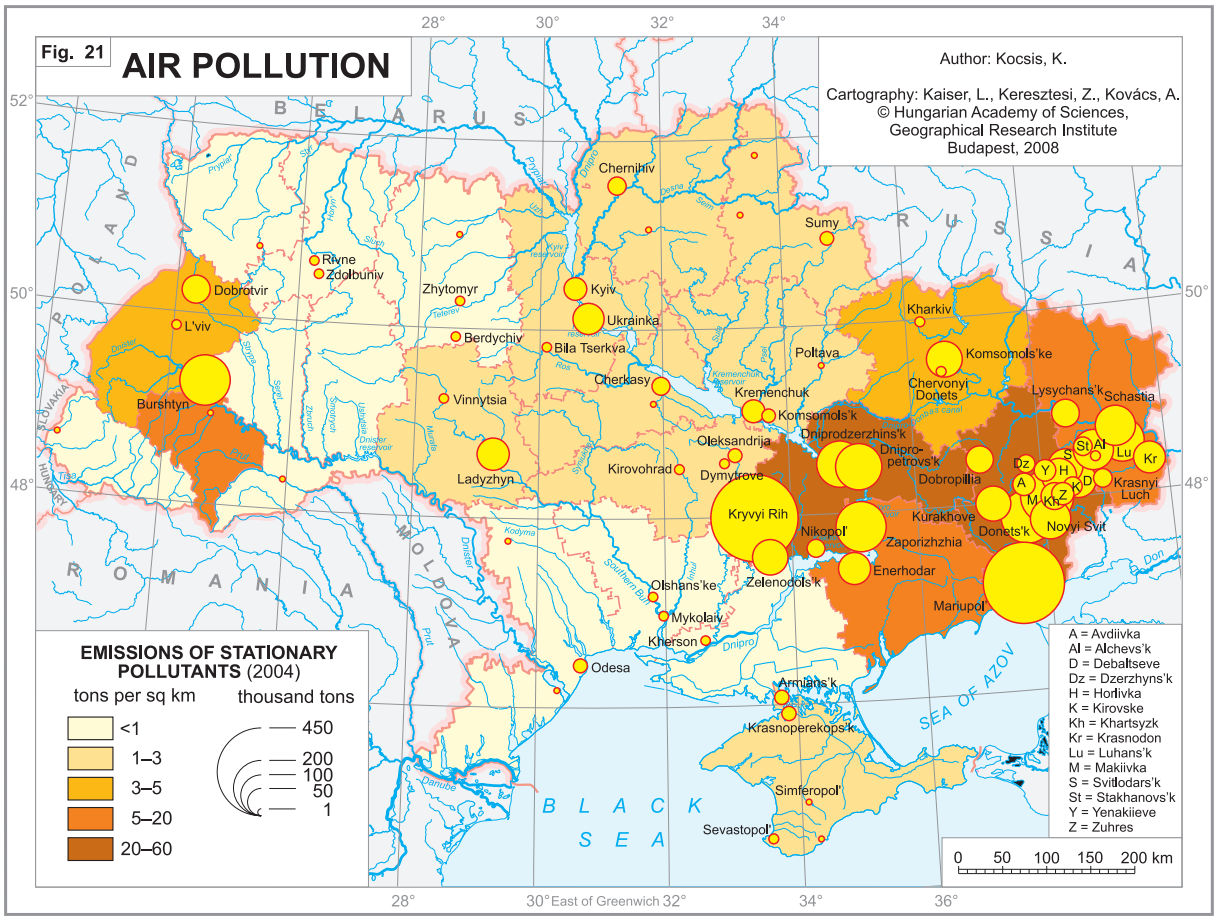


wastes as by-products of human economic activities (*Figure 21*). These issues heavily affected Ukraine as well. Recently, governmental agencies, corporate management, and the population have made efforts to reduce anthropogenic pressure on the physical environment, which still remains at a significant scale. This situation mainly stems from the obsolete technologies of production and outdated waste treatment facilities.

On the territory of Ukraine the totel emission of pollutants and contaminants per capita amounted to ca 100 kilograms in 2005. The highest emissions were typical of the stationary polluters in the highly industrialized oblasts of the country: Donets'k, Dnipropetrovs'k, Luhans'k, Zaporizhzhia (*Figure 22*). These regions are dominated by iron and steel and chemical industries and manufacturing as well as coal and metal ores mining. In several oblasts transport emissions are the main sources of pollution; in 19 of them the emission volumes of exhaust gases even exceed those from stationary sources.

As a consequence of an ongoing negative trend of growing specific use of freshwater resources (per product unit) and a concurrent contamination of water bodies with insufficiently treated waste water, an ecological crisis situation has emerged in the basins of Northern (Sivers'kyi) Donets', water courses flowing to the Sea of Azov, and in some tributaries of Dnister, Dnipro and Western (Zakhodnyi) Buh. During recent years waterlogged surfaces have become a widespread phenomenon in Dnipropetrovs'k, Donets'k, Odesa and Kherson oblasts. Extremely high groundwater table is typical over ca 17% of the country's territory.

Long-lasting intense cultivation of soils and cuts in the financial sources for soil conser-



vation have led to negative processes such as erosion, secondary salinization, waterlogging, and the loss of humus reserves. These processes have an extremely adverse impact on the living conditions of population.

As a consequence of the Chernobyl disaster (April 26, 1986) radioactive contamination extends over a land area of 54 thousand square km (including 25 thousand square km of woodland). After this accident, the most devastating in the history of nuclear power production, 336,000 people had to be evacuated immediately or resettled later, including ca. 50,000 persons from Prypiat' town, located close to the power plant. The number of Soviet citizens exposed to radiation was estimated at 6.6 million; including 9,000 victims who presumably died of cancer (IAEA Report). Due to the prevailing meteorological conditions of that time the radioactive fall-out (e.g. caesium-137, iodine-131, strontium-90) seriously affected a horseshoe shaped area in the west of Ukraine (Polissia, Kyiv–Vinnytsia region, Middle-Dnister area). An overwhelming majority of the persons registered as victims of the Chernobyl disaster (2.6 million in 2005) can be found in the area mentioned above (*Figure 23*). Following the establishment of the Chernobyl Shelter Fund (1997, Denver G7 summit) a Shelter Implementation Plan was set up to ensure ecologically safe conditions on the Chernobyl site (e.g. stabilization of the sarcophagus, construction of a New Safe Confinement). The European Community contributed €621.1 million to the Chernobyl Shelter Fund between 1991 and 2006.

Nature conservation areas. There are many unique and picturesque places of high aesthetic value in Ukraine. They are encountered in each region of the country, and a number of them are described in literary works, portrayed on paintings or represented in musical compositions. Many of these objects are protected as part of natural heritage and declared nature reserves (*Figure 24*). Some of these places characteristic for certain zones and regions are mentioned below. In the environs of Kyiv it is Koncha-Zaspa, Puscha-Voditsa, Tripolie. On the Polissia there are hundreds of beautiful lakes, such as Svitiaz' of karst origin. Kaniv urochishches within forest steppe in the surroundings of Cherkasy are

Fig. 22

ECOLOGICAL SITUATION

Authors: Rudenko, L., Razov, V., Baranovskyi, V.
Cartography: Prokop'ieva, V. SSPE Kartohrafiia
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Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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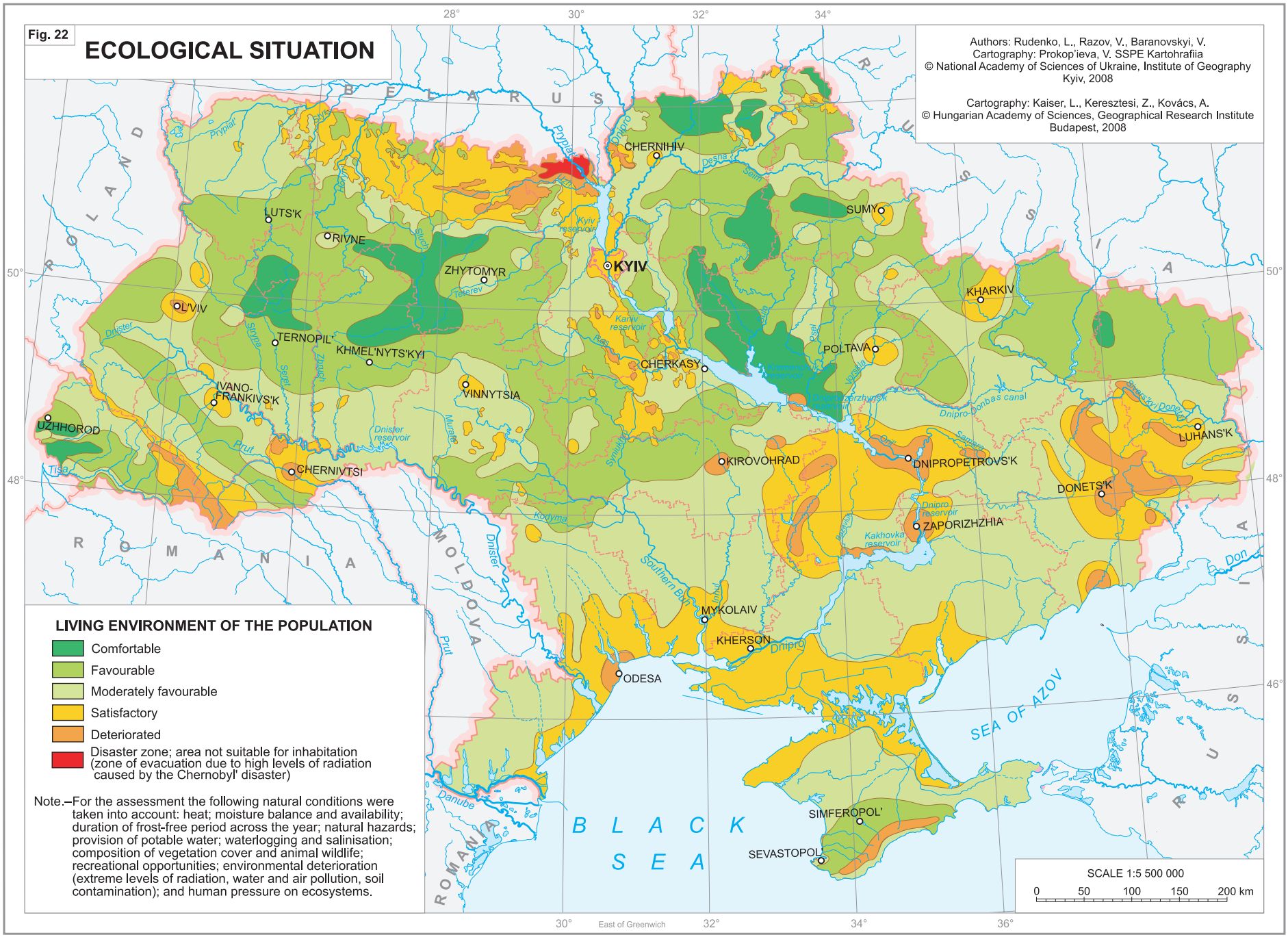
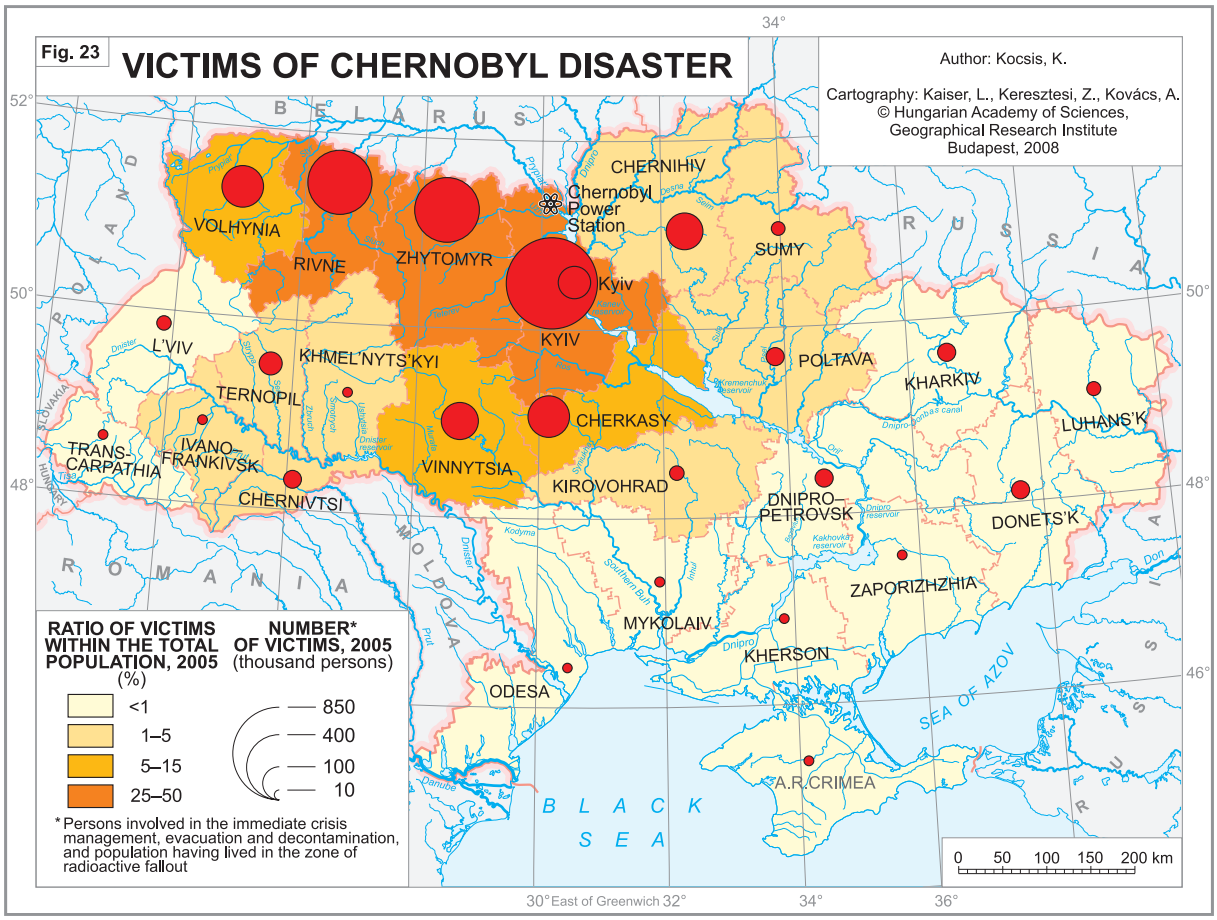


LIVING ENVIRONMENT OF THE POPULATION

- Comfortable
- Favourable
- Moderately favourable
- Satisfactory
- Deteriorated
- Disaster zone; area not suitable for inhabitation (zone of evacuation due to high levels of radiation caused by the Chernobyl' disaster)

Note.–For the assessment the following natural conditions were taken into account: heat; moisture balance and availability; duration of frost-free period across the year; natural hazards; provision of potable water; waterlogging and salinisation; composition of vegetation cover and animal wildlife; recreational opportunities; environmental deterioration (extreme levels of radiation, water and air pollution, soil contamination); and human pressure on ecosystems.



depicted in Taras Shevchenko's poetry, landscapes around Chernihiv along Desna river are shown by Oliksandr Dovzhenko, wide Taurian steppes with the celebrated Askania-Nova Reserve appear in the works by Oles' Honchar. Ancient coral formations of Neogene seas, locally called tolters (medobors), stretch over Podillia. Subtropical vegetation and mountain waterfalls on the southern coasts of Crimea are famous far beyond the borders of Ukraine. The poet Ivan Franko portrayed the majestic peaks of the picturesque forested Carpathians, the volcanic range and mountain meadows (polonins). There are a number of wonderful places on the Black Sea and Sea of Azov coasts. Physico-geographical regions reflect a diversity of natural landscapes in Ukraine to be cherished and preserved for the forthcoming generations.

The fond of ***natural reserves*** in Ukraine constitutes 2.8 million hectares, 4.7% of the state territory (As January 1, 2007). Out of this area 7.9% is covered by four *biosphere reserves* (Askania-Nova, Black Sea, Carpathian, Danubian), 5.8% by 17 *natural reserves* (e.g. Crimean, Gorgans, Polissian, Roztochchia, Ukrainian Steppe), 25.1% by 19 *national natural parks* (e.g. Azovo–Syvashian, Carpathian, Desna–Stara Huta, Podillian Tovtry, Shats'kyi, Sviati Hory) and 19.8% by 46 *regional landscape parks* (e.g. Kinburns'ka kosa, Mizhrichyns'kyi, Seimskyi, Tylihul's'kyi). Among them the most visited by tourists are the Shats'kyi, Carpathian, and Sviati Hory national parks and the Askania-Nova biosphere-reserve (100–300 thousand visitors per year). In addition, there are 2,693 partial (e.g. landscape, hydrological, botanical, zoological) reserves, 3,057 monuments of nature or natural sights, 618 botanical and zoological parks, dendroparks, and parks featuring landscape architecture and 739 protected woodland features.

Fig. 24

PROTECTED AREAS OF NATIONAL IMPORTANCE

Authors: Liashenko, D., Voznii, Yu.
Cartography: Prokop'ieva, V. SSPE Kartohrafiia
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Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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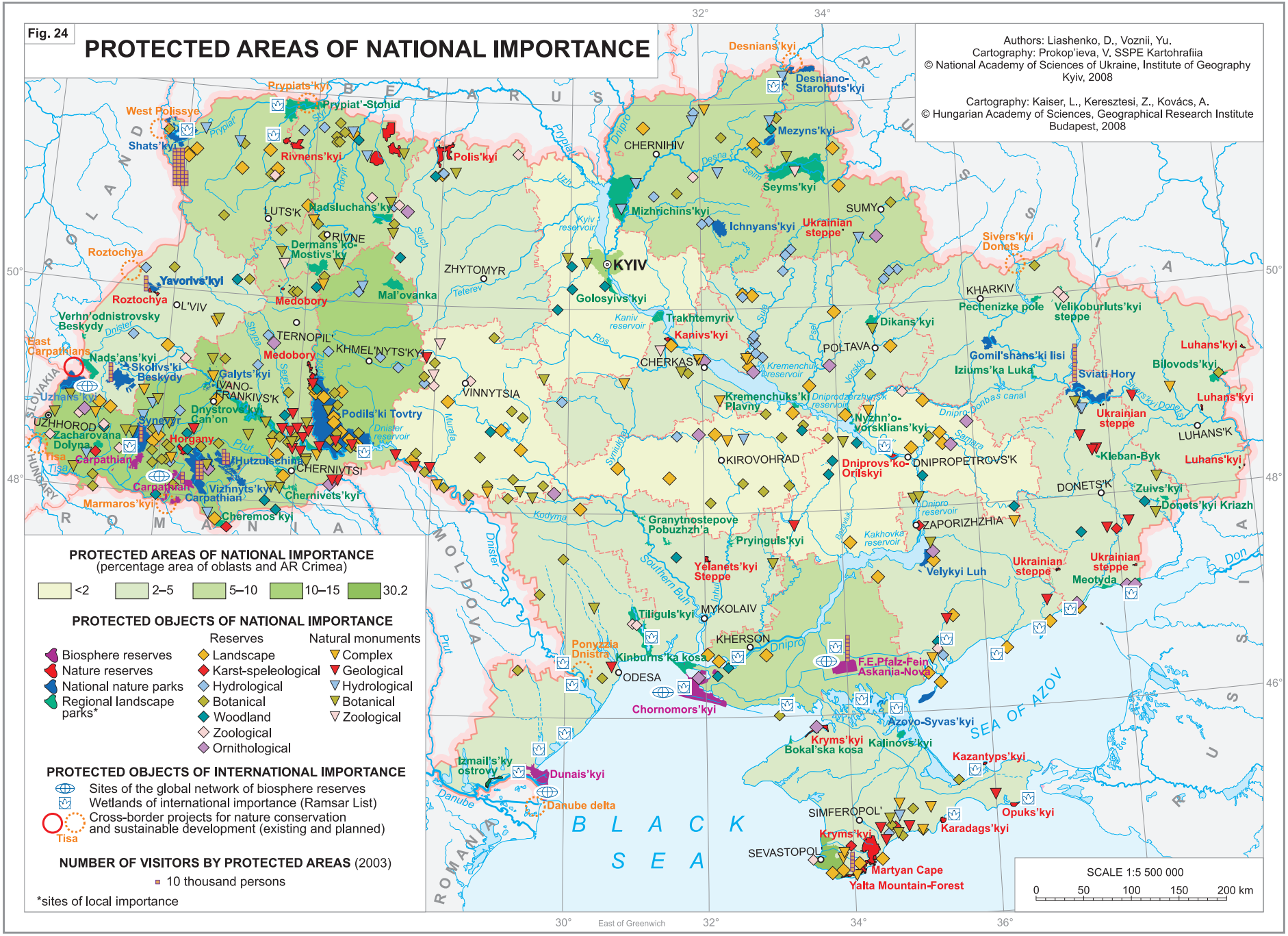


PROTECTED AREAS OF NATIONAL IMPORTANCE
(percentage area of oblasts and AR Crimea)

<2 | 2–5 | 5–10 | 10–15 | 30.2

PROTECTED OBJECTS OF NATIONAL IMPORTANCE

- Biosphere reserves
- Nature reserves
- National nature parks
- Regional landscape parks*

Reserves
- Landscape
- Karst-speleological
- Hydrological
- Botanical
- Woodland
- Zoological
- Ornithological

Natural monuments
- Complex
- Geological
- Hydrological
- Botanical
- Zoological

PROTECTED OBJECTS OF INTERNATIONAL IMPORTANCE

- Sites of the global network of biosphere reserves
- Wetlands of international importance (Ramsar List)
- Cross-border projects for nature conservation and sustainable development (existing and planned) — Tisa

NUMBER OF VISITORS BY PROTECTED AREAS (2003)

▪ 10 thousand persons

*sites of local importance

POPULATION

Ethnicity, Language and Religion

The Ukrainians are – following the Russians and Poles – the third largest Slavic ethnic group in the world (*Table 3*). The 41 million European Ukrainians represent the sixth (among the Slavs, the second) largest ethnic group of the continent. They belong to the Eastern Slavic branch of the Slavic group within the Indo-European language family. The Ukrainian ethnos was formed between the 13th and 15th centuries from the Medieval East Slavic tribes (Polians, Derevlians, Siverians, Volhynians, White Croats, Tyvertsi and Ulychi) who lived on the present-day territory of Ukraine. Accordingly, the ethnonym "Ukraintsy" (Ukrainians) has been widely used since the late 16th century.

An overwhelming majority (81.2%) of Ukrainians live in their nation state, in Ukraine. The others, mostly as diaspora population found new homes in different parts of the globe during the 18–20th centuries (*Table 4*). Due to its pivotal geographic location the present-day territory of Ukraine has a centuries-old multi-ethnic character, which was pronounced until the mid-20th century. Although the Ukrainians have continuously been the dominant nation (72–78%) and the Russians the largest national minority (8–22%) during the last century, other ethnic groups represented 17–19% of the population until the 1940s.

The dynamic change in the ethnic structure of Ukraine's population, especially in the 20th century, was the result of not only ethnic processes, but political and other events that took place in Europe, the Russian Empire and the Soviet Union (*Table 5*). Due to warfare and the forced migration of the Polish, Jewish, German and Tartar population, they almost disappeared from the western and southern territories (e.g. Galicia, Volhynia, Crimea) (*Figure 25*).

With respect to the change in the ratio of Ukrainians and Russians (the latter being the dominant ethnic group of the Russian Empire and of the USSR), different and opposite trends can be observed over the 20th century. The Ukrainian–Russian ethnic changes were controlled by the migration flows and assimilation processes arising as a product of the ethnic policy in the Soviet Union. "Ukrainisation" in the early Soviet period (1921–32) had led to an increase in the ratio of Ukrainians from 72% to 74.8%. The following period was characterised by the persecution of Ukrainians and "Russification". As a consequence of a systematic Soviet assault upon the Ukrainian identity, the percentage of Ukrainians decreased to 73% by 1989. About 3–3.5 million people died (Istoria Ukrainy 2002) due to an artificially engineered famine, particularly affecting the Ukrainian peasantry (Holodomor, 1932–33) and the country experienced massive immigration of Russians in the frame of Soviet industrialisation.

According to the first All-Ukrainian population census (December 5th, 2001), the two major ethnic groups represented more than 95% of the total population. The Ukrainians, as the founder nation accounted for 77.8% and the Russians for 17.3%. The number (and percentage) of other national minorities remained between 50,000 and 300,000 (or 0.2–0.6%) in the case of 11

Table 3. ***Distribution of Ukrainians, Poles and Russians in the world (between 2001–2006; in millions)***

	World	Europe	Other continents	In their nation state	Beyond the borders of their nation state		
					Total	In the West	In the East (Former USSR)
Ukrainians	46.2	41.0	5.2	37.5	8.7	4.2	4.5
Poles	52.0	38.5	13.5	37.0	15.0	14.9	0.1
Russians	137.0	94.1	42.9	115.9	21.0	4.0	17.0

Source: Census data and http://en.wikipedia.org

Table 4. ***Number and distribution of Ukrainians in the world (1897–2001)***

Year	Total		Ukraine (present-day territory)		Former USSR (Ukraine excluded)		Europe proper		America		Australia	
	in 1,000	%	in 1,000	%	in 1,000	%	in 1,000	%	in 1,000	%	in 1,000	%
1897–1900	26,365.5	100	20,977.9	79.6	4,370.2	19.9	847.4	3.2	170.0	0.6	..	..
1910–1917	35,544.7	100	27,050.8	76.1	7,082.7	19.9	1,021.2	2.9	380.0	1.1	..	..
1926–1931	37,227.8	100	27,567.6	74.1	8,344.4	22.4	745.8	2.0	570.0	1.5	..	..
1939	35,616.6	100	29,606.8	83.1	4,524.7	12.7	876.1	2.5	609.0	1.7	..	..
1959	38,624.7	100	32,158.4	83.3	5,063.3	13.1	335.0	0.9	1,053.0	2.7	15.0	0.0
1979	44,083.9	100	36,488.9	82.8	5,858.3	13.3	490.0	1.1	1,220.0	2.8	20.0	0.0
1989	46,136.0	100	37,419.0	81.1	6,764.0	14.7	500.0	1.1	1,428.0	3.1	25.0	0.1
1989*	51,864.0	100	37,400.0	72.1	11,060.0	21.3	853.0	1.6	2,516.0	4.9	35.0	0.1
2001	46,161.0	100	37,541.7	81.9	4,508.8	9.2	710.5	1.5	3,366.0	7.3	34,0	0.1

Sources: Census data, http://en.wikipedia.org;
1989* Estimation of «Entsiklopediia ukrainoznavstva» (Toronto, 1993).

ethnic groups (e.g. Byelorussians, Moldovans, Crimean Tartars, Bulgarians, Hungarians, etc.). In the period between the censuses of 1989 and 2001 – in spite of a considerable population loss (more than 3 million) – the number of ethnic Ukrainians slightly increased, whereas that of the Tartars, Armenians and Azeris grew dynamically. At the same time, persons declaring Russian ethnicity dropped by 26.6%. The main reasons behind these changes were migration, natural population change and changing ethnic identity. Following 1989 (or to be more precise, 1991) the return of Ukrainians, of previously deported ethnic groups (e.g. Crimean Tartars,

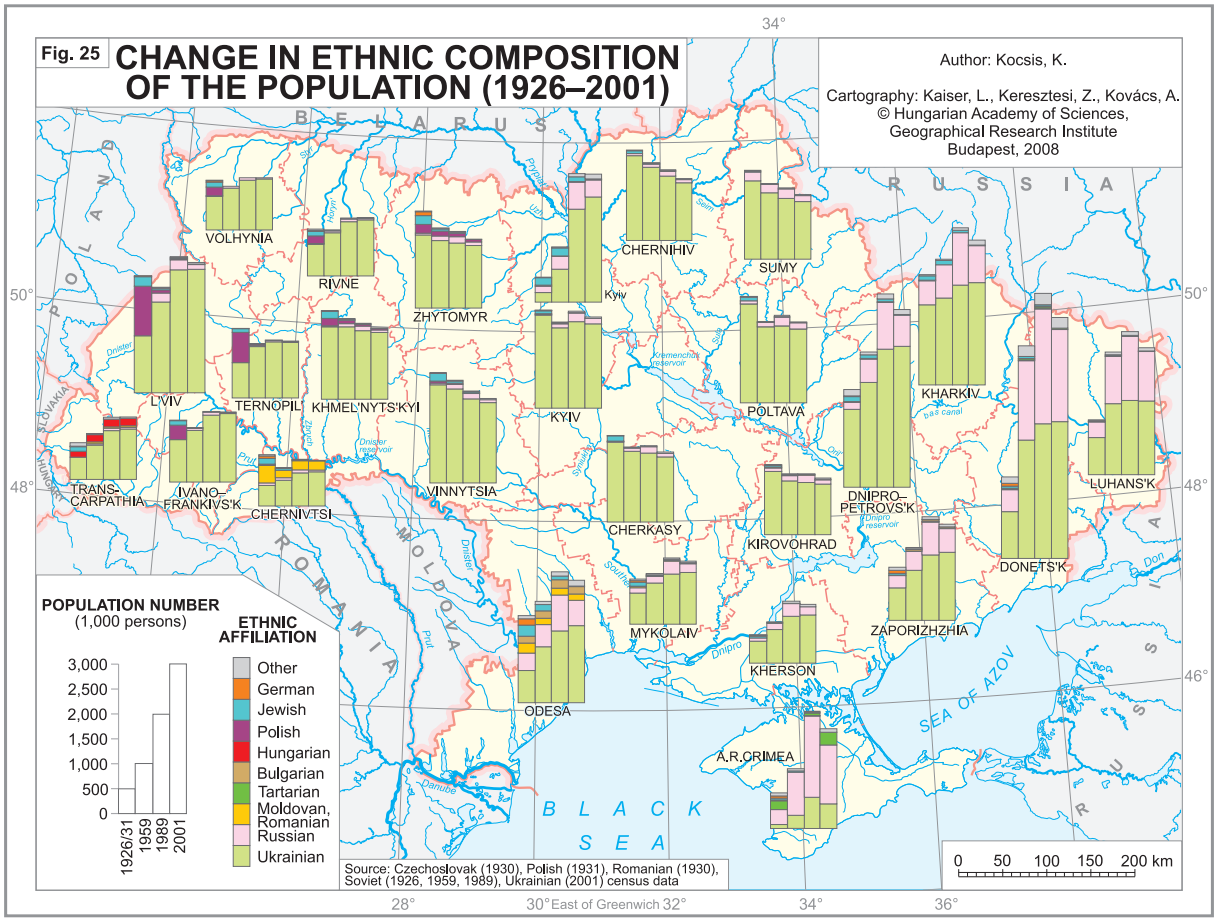


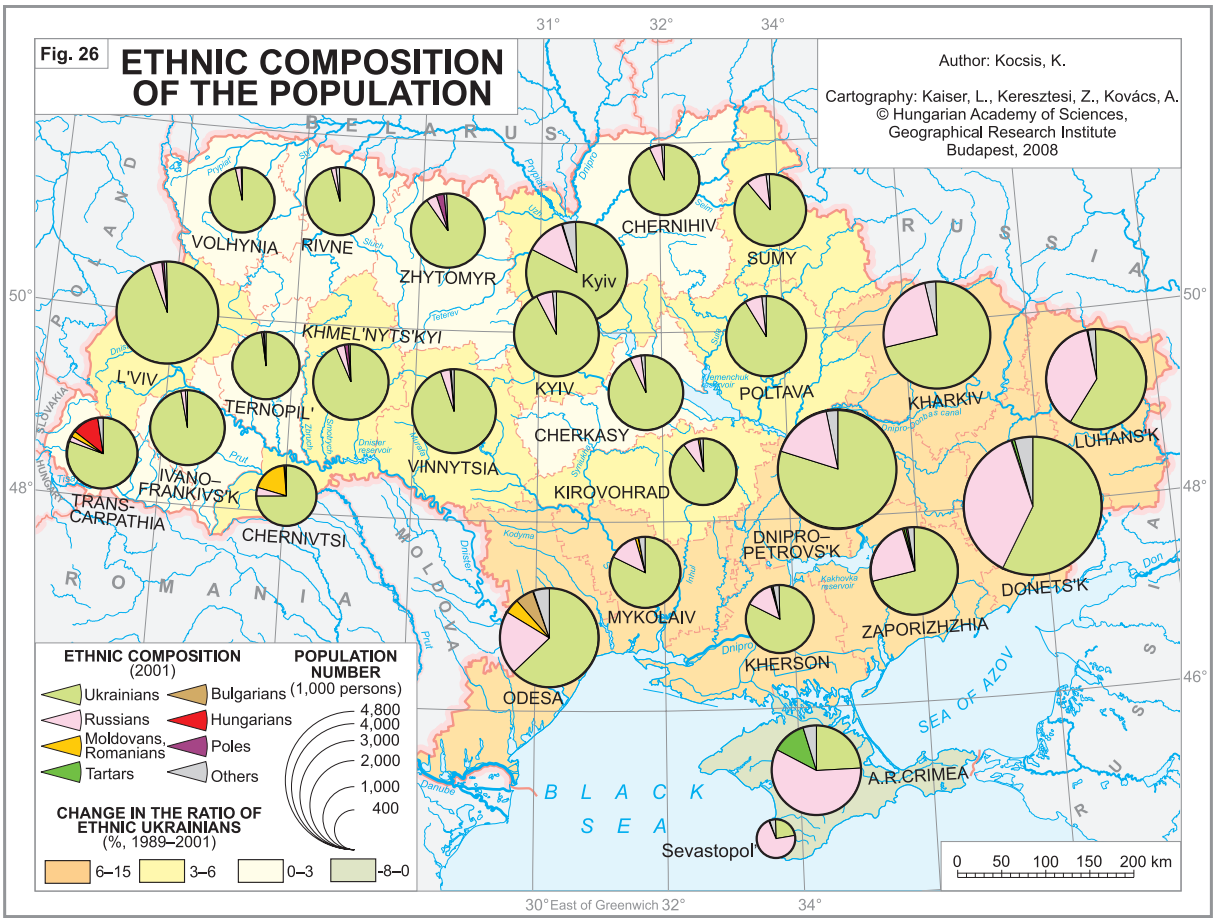
Table 5. ***Ethnic structure of the population on the present-day territory of Ukraine (1897–2001)***

	1897/1900	1930/1931	1959	1970	1979	1989	2001
	Population number in thousands						
Total population	29,397	40,889	41,869	47,127	49,609	51,452	48,241
Ukrainians	21,100	30,584	32,158	35,284	36,489	37,419	37,542
Jews	2,615	2,654	840	776	633	486	104
Russians	2,401	3,303	7,091	9,126	10,472	11,356	8,334
Poles	1,256	2,211	363	295	258	219	144
Germans	617	630	23	30	34	38	33
Moldovans, Romanians	419	463	343	378	416	460	410
Crimean Tartars	195	225	..	4	7	47	248
Bulgarians	188	202	219	234	238	234	205
Hungarians	108	118	149	158	164	163	157
Bielorussians	122	84	291	386	406	440	276
Greeks	100	126	104	107	104	99	92
Czechs, Slovaks	34	87	29	22	20	17	12
Armenians	15	21	28	33	39	54	100
Roma (Gypsies)	..	22	23	30	34	48	48
Azeris	..	..	7	11	17	37	45
Others	227	159	201	253	278	335	491
	in %						
Total population	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ukrainians	72.0	74.8	76.8	74.9	73.6	72.7	77.8
Jews	9.0	6.5	2.0	1.6	1.3	0.9	0.2
Russians	8.8	8.1	16.9	19.4	21.1	22.1	17.3
Poles	4.4	5.4	0.9	0.6	0.5	0.4	0.3
Germans	2.1	1.5	0.1	0.1	0.1	0.1	0.1
Moldovans, Romanians	1.0	1.1	0.8	0.8	0.8	0.9	0.8
Crimean Tartars	0.7	0.6	..	0.0	0.0	0.1	0.5
Bulgarians	0.5	0.5	0.5	0.5	0.5	0.5	0.4
Hungarians	0.4	0.3	0.4	0.3	0.3	0.3	0.3
Bielorussians	0.3	0.2	0.7	0.8	0.8	0.9	0.6
Greeks	0.3	0.3	0.2	0.2	0.2	0.2	0.2
Czechs, Slovaks	0.2	0.2	0.1	0.0	0.0	0.0	0.0
Armenians	0.0	0.1	0.1	0.1	0.1	0.1	0.2
Roma (Gypsies)	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Azeris	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Others	0.4	0.4	0.4	0.6	0.6	0.7	1.1

Sources: Chornyi, S. (2001); Naulko, V. (1998); Soviet (1959–1989) and Ukrainian (2001) census data.

Germans and Greeks) and the immigration of Caucasian people to Ukraine (as a result of crisis in their home countries) notably altered the population statistics. At the same time, there was a massive outflow of Russians, Byelorussians, Jews, Germans, Poles, Hungarians and Greeks to their mother country and significant outward migration of ethnic Ukrainians to the European Union due to economic crisis in Ukraine. As a result of the measures taken by the state (e.g. declaring Ukrainian to be the only official state language), masses of Russians, people of mixed (Russian–Ukrainian) origin and Russian-speaking Ukrainians in the eastern and southern parts of the country (excluding Crimea) began to assume a Ukrainian identity (*Figure 26*).

The state-founding nation of the country, the **Ukrainians** (37.5 million) constituted 77.8% of total population in 2001. Out of the 27 regional units, in 13 the Ukrainians formed



the overwhelming majority (over 90%) and in 7 regions they represented a significant majority (between 70 and 90%). Only in the Autonomous Republic of Crimea did their ratio remain below 50% (24.3%). Ternopil' and Ivano-Frankivs'k oblasts in Galicia have proven to be almost homogeneous ethnic regions, where 97.5–97.8% of inhabitants were Ukrainians.

Based on living conditions provided by the natural environment, culture and lifestyle, several ***ethno-cultural groups*** can be identified within the Ukrainian nation. The area inhabited by the *Hutsuls* is the highest and most picturesque part of the Carpathian mountains, the region from where the Prut, Siret and Tisa rivers rise (in Ivano-Frankivs'k, Chernivtsi and Transcarpathian oblasts). Traditional Hutsul society was supported by forestry, logging, cattle, sheep and horse ("Hutsul pony") breeding. The settlement area of the Boikos extends over the central parts of the Ukrainian Carpathians, between the river-heads of the San, Latorytsia, Rika and Limnitsa (in L'viv, Ivano-Frankivs'k and Transcarpathian oblasts). Their actual centre is the town of Skole. The historical homeland of the *Lemkos* (or Rusnaks) is to be found between the High Tatras and the San river, in the mountain ranges of the Beskids (Carpathians) in Poland, Slovakia and Ukraine (in Transcarpathian oblast, Velykyi Bereznyi district). Due to the military operations of the Ukrainian Insurgent Army (UPA) in Poland, out of the 140,000 Lemkos in Poland, 90,000 were deported to the USSR and 35,000 to the western and northern territories of Poland in Operation Wisla of the late 1940s. In Slovakia, the majority of Lemkos were "Slovakised" during the last century (1910: 97,000; 2001: 35,000 Ukrainians). The *Rusyn* identity survived almost exclusively outside of Ukraine (e.g. in Slovakia, Hungary, Serbia, Romania, and in the western diaspora). In Ukraine, the Rusyns are officially considered to be a subgroup of the Ukrainian nation.

There are Ukrainian ethno-cultural groups in the Polissian Lowland, and in the northern borderlands – *Pinchuks, Polishchuks* and *Litvins*. During various historical periods a large portion of Ukrainians that settled along the middle reaches of the Dnipro were called *Cherkashs.*

63% of Ukrainians are urban dwellers and they constitute 73.3% of the total number of

urban inhabitants. The average age of Ukrainians recorded by the census of 2001 is 38.2 years. Around 35% of them (aged 25 years and over) have diplomas of higher education.

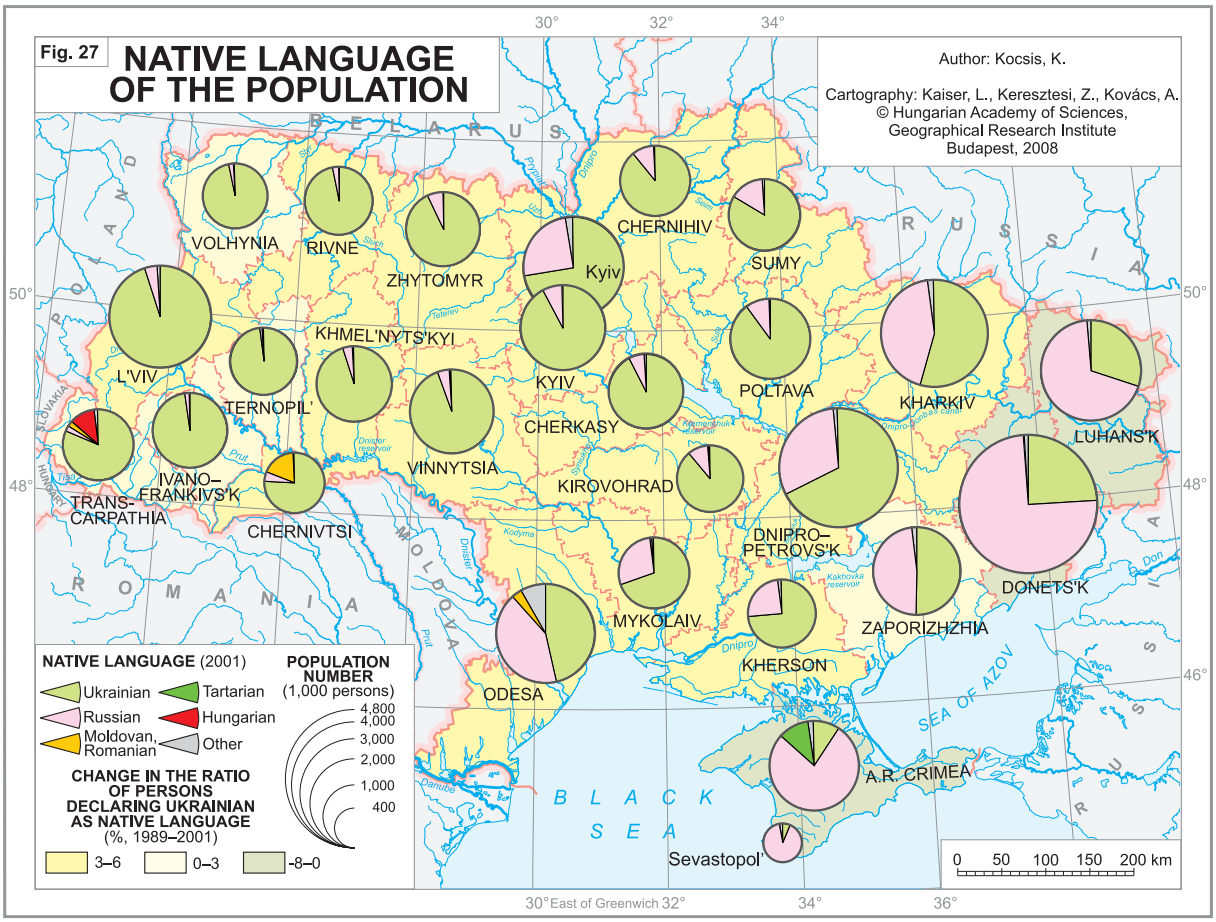
Russians are the most populous ethnic minority (8.3 million or 17.3%). Their ratio is especially high in Crimea, the only region of the country where Russians form an absolute majority (58.3%). In Luhans'k and Donets'k oblasts their share is 38–39% of the total population. The dominant Russian (ethnic and linguistic) presence in the southern and eastern parts of the country, and in Kyiv, is not exclusively the result of Russification in the 20th century. Kyiv and the major cities of the regions mentioned above (e.g. Kharkiv, Luhans'k, Katerinoslav/Dnipropetrovs'k, Mariupol', Kherson, Mykolaiv, Odesa, Simferopol', Sevastopol', Kerch and Feodosiia) already had a Russian majority during the census of 1897. The average age of Russians is 41.9 years. 86.8% of them are urban dwellers and 47.6% of their population aged 25 years and over have completed higher education.

Around 5% of the country's population belongs to other **national and ethnic minorities** (e.g. Byelorussians, Moldovans, Crimean Tartars, Bulgarians, Hungarians, Romanians, Poles, Jews, Armenians and Greeks). None of the above ethnic groups reach 1% of the total population of Ukraine. Their regional distribution however shows wide variation: e.g. Crimean Tartars consist of 12% within the population of Crimea; Greeks have a 1.6% share in Donets'k oblast; Poles represent 3.5% in Zhytomyr and 1.6% in Khmel'nits'kyi oblasts. In Transcarpathia the share of Hungarians is 12.1%, Roma make-up 1.1% and Romanians 2.6%; the ratio of the latter exceeds 12% in Chernivtsi oblast. Bulgarians live in Zaporizhzhia and Odesa oblasts (1.4% and 6.1%, respectively). Moldovans make up 5% in Odesa and more than 7% in Chernivtsi oblasts. The youngest ethnic group in Ukraine is Crimean Tartar (33.4 years on average). Jews are the most urbanised, whereas most of the Romanians and Moldovans live in rural areas.

In Ukraine, the official state **language** is Ukrainian. Out of the ca. 40 million ***Ukrainian*** native speakers across the world, 82.7% live in Ukraine, where at the time of the 2001 census, 67.5% of the country's inhabitants declared Ukrainian as their native language (2.8% increase compared to 1989). Following 1991, large amounts of the Russian-speaking population of mixed ethnic origin declared Ukrainian as a mother tongue, even though remaining practically Russophone. At the same time, in the regions dominated by Russophones (Crimea, Donets'k and Luhans'k oblasts) a continuing decrease in the ratio of Ukrainian native speakers could be observed (*Figure 27*). ***Russian*** was indicated as the mother tongue by 29.6% (14.3 million) of the population, i.e. 3.2% less than in 1989. At that time, 50–60% of ethnic Ukrainians in the Donets'k and Luhans'k oblasts and in Crimea declared Russian as their mother tongue. Also due to this fact, the cities and towns in the regions mentioned above, the majority of coastal areas and Kharkiv, Dnipropetrovs'k, Zaporizhzhia were dominated by Russian native speakers. The relation of the native language to ethnic affiliation is an important indicator of ethnic–national development. Language and ethnicity coincided in 85% of Ukrainians (78% of urban dwellers and 97% of rural inhabitants), 96% of Russians, 95% of the Hungarians, and 92% of the Crimean Tatars.

According to the 2001 census data, 87.9% (1989: 78%) of the citizens of Ukraine have a fluency in Ukrainian. Their percentage is the highest in the west of the country (89–99%) and in the northern regions (95–99%). In the central part of Ukraine it drops to 70%, whilst in the south and east it reaches 40%. However, Ukrainian is used in everyday life to a much lesser extent than would be suggested by the figures on the command of languages, and less frequently in the southern and eastern regions among Ukrainian native speakers. 65.7% of the country's population had a perfect command of Russian in 2001, although this ratio had dropped by 12.7% compared to 1989. According to a representative inquiry, ca. 60% of the population in the southern and eastern regions predominantly use Russian in everyday life. In general, the majority of ethnic minorities adhere to their own language with a gradual spread of bilingual and multilingual abilities. Romanians and Hungarians of the mono-ethnic villages of Transcarpathia and Chernivtsy oblasts are increasingly mono-lingual.

Different estimations exist with respect to the number of **Ukrainians abroad.** Their number at the beginning of the 21st century (according to census data and estimations) could be 7–8 million (*Figure 28*). It is customary to distinguish between the western and eastern diasporas.



The ***western Ukrainian diaspora*** – with a history of over one hundred years – has been shaped by subsequent waves of emigration: 1870–1914; 1918–1939; and following 1945. Nowadays, a fourth phase is referred to, which started with the disintegration of the Soviet Union. The first wave of migration was characterised by the movement of rural people from the west of Ukraine, i.e. provinces of the Austro–Hungarian Monarchy, to America. During the second period, a great number of political emigrants, academics and artists were added to this first group of labour migrants. Following the Second World War, an overwhelming majority of migrants were driven by political motivations. Finally, the fourth and present wave of migration has been almost fully economic, but on an entirely new basis. It is represented by a skilled labour force and scientific–technical professionals predominantly in the sphere of I.T. and programming, the manufacture of new materials and biotechnology, and other sophisticated spheres of science. These days the most populous are diasporas in the USA (890 thousand according to the census of 2002), Canada (1,071 thousand per the census of 2001), Brazil (970 thousand) and Argentina (305 thousand). Ukrainians also live in Paraguay, Uruguay and Venezuela. A high percentage of Ukrainians with higher education live among the American diaspora. The Ukrainian language is taught at 28 colleges in the USA and 12 universities in Canada.

At the beginning of the 21st century, the number of Ukrainians resident in the European Union was put at between 500 and 900 thousand by different statistical data. The most important Ukrainian communities (mostly "guest-workers") can be found in Germany (128 thousand), Italy (107 thousand), Portugal and Spain (65–66 thousand). According to the latest censuses, sizeable autochthonous Ukrainian populations live in Romania (61 thousand), Poland (37 thousand, although according to estimations this is 200 thousand) and in Slovakia (35 thousand).

The emergence of the ***Ukrainian eastern diaspora*** in Russia started after the Treaty of Pereiaslav (1654). At that time a massive resettlement of Ukrainian clergy and cultural representatives was ongoing, and later, following the abortive secession attempt from Russia (1708–

Fig. 28

UKRAINIANS ABROAD

Authors: Rudenko, L., Bochkovs'ka, A., Vynnychenko, I., Liashenko, D.
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Cartography: Kaiser, L., Keresztesi,Z., Kovács, A.
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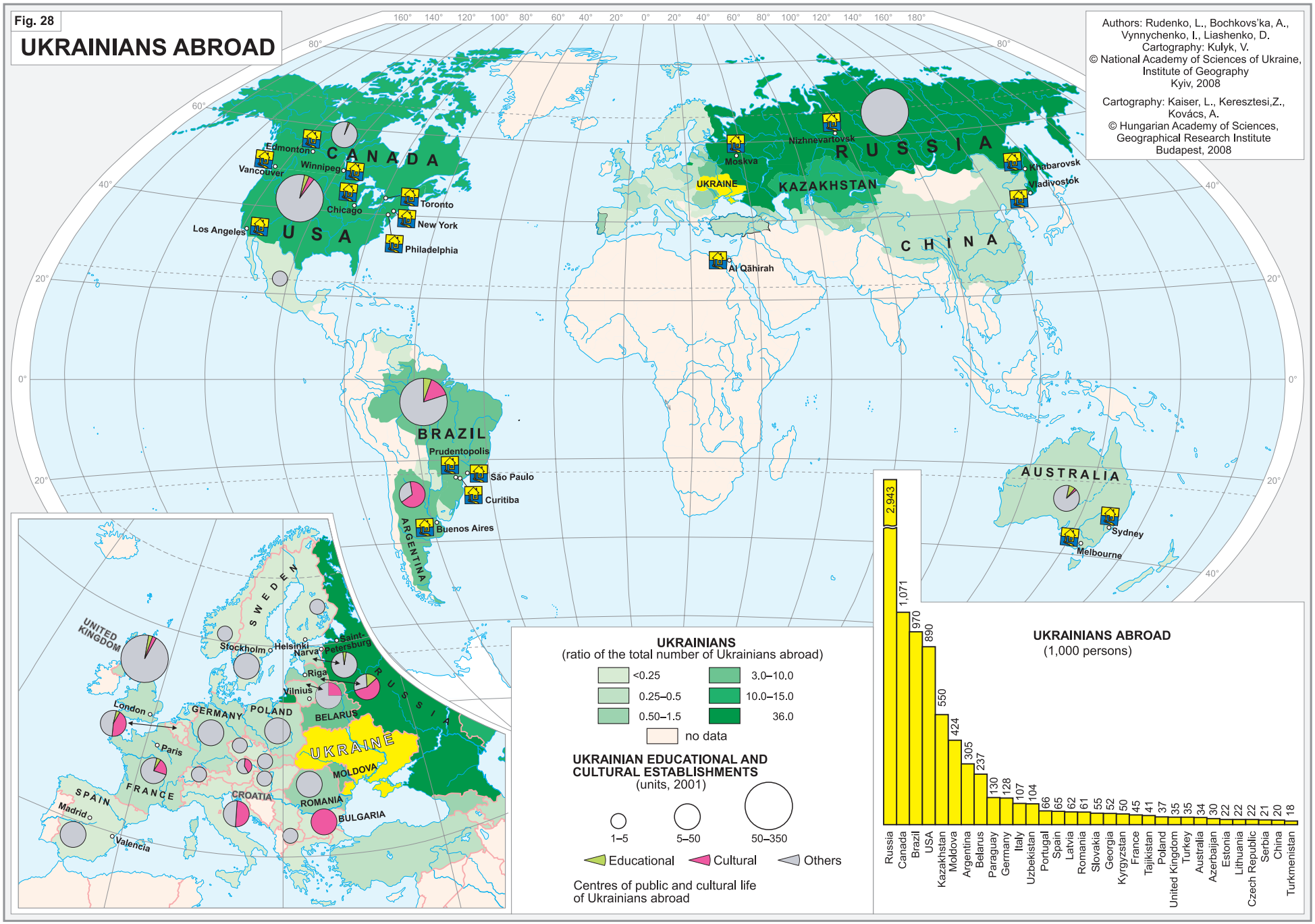


UKRAINIANS
(ratio of the total number of Ukrainians abroad)

<0.25	3.0–10.0
0.25–0.5	10.0–15.0
0.50–1.5	36.0
no data	

UKRAINIAN EDUCATIONAL AND CULTURAL ESTABLISHMENTS
(units, 2001)

1–5 · 5–50 · 50–350

Educational · Cultural · Others

Centres of public and cultural life of Ukrainians abroad

UKRAINIANS ABROAD
(1,000 persons)

1709) led by I. Mazeppa, en masse deportations of Ukrainians to Siberia and to the northern regions of the Russian Empire were launched. After the fall and elimination of Zaporozhian Sich in 1775, a Cossack diaspora had formed in the Kuban region. Starting with the second half of the 19th century, emigration to Russia accelerated, triggered by the underdeveloped economy of the Ukrainian provinces and ultimately resulted in a massive resettlement to Siberia, Altai and the Far East. Encouraged by the reforms initiated by P. Stolypin (head of the Tsarist government in the early 20th century), with the opportunity to obtain free land, a considerable portion of migrants resettled to the remotest regions of the Russian Empire, forming compact Ukrainian ethnic blocks in Siberia, Kazakhstan, Central Asia and the Far East. Thus, more than 7 million Ukrainians lived in the Empire beyond the limits of their ethnic territory in 1917.

The following wave of migration has been associated with the organised collection of manpower in the 1950–60s, in order to take possession of virgin and waste-land in Kazakhstan, Siberia and the Altai region. This was organised to facilitate work on large construction projects aimed at the exploration of oil and gas fields, and timber resources in Siberia. This was accompanied by an ongoing and massive outflow of highly qualified professionals, scholars and creative intelligentsia from Ukraine to Moscow and other urban centres in Russia. Along with migration for economic reasons, it is the deportations which have played a crucial part in the history of the Ukrainian nation. Relating to the collectivisation of the 1930s and the repression involved, ca. 1.3 million people were deported. Deportation continued subsequently, when the "enemies of the nation" – adherents of the Ukrainian People's Republic – were expelled, including thousands of families of members of nationalist organisations and of the Ukrainian Insurgent Army (UPA), along with other elements considered to be unreliable from a Soviet perspective: Crimean Tartars, Germans, Greeks, etc. These deportations continued into the 1950s.

Similar to the western diaspora, the fourth wave of eastern outflow, starting with the collapse of the Soviet Union, had an economic basis and prompted a considerable mass of people to resettle to the Russian Federation. In the early 21st century, this is where the most populous Ukrainian diaspora is to be found: over 2.9 million according to the census of 2002 held in Russia. A sizeable diaspora has formed in other countries of the post-Soviet space: Kazakhstan (550 thousand), Moldova (424 thousand), and Belarus (237 thousand). Ukrainians also live in Kyrgyzstan (50 thousand), Georgia (35 thousand), Azerbaijan (29 thousand) and in other CIS states.

The need for **religion and churches** in Ukrainian society is pronounced. The majority of Ukrainians view religion as a primary necessity of life and they are sure that religion is a factor in their democratisation. Religious organisations and churches have a strong influence upon the political views of their adherents and the willingness to take part in elections is higher among believers than among non-believers.

Owing to the lack of census data, an insight into the ***religiosity*** and denominational structure of the Ukrainian population can be discovered through the nationwide sociological surveys carried out during the last decade (e.g. Institute of Sociology of the NAS of Ukraine; Kyiv International Institute of Sociology, Razumkov Centre). According to these surveys, an increase in the ratio of *believers* and the diversification of their confessional affiliation is observable. The share of believers increased from 57.8% to 75.2% between August 2000 and October 2003 (Razumkov Centre). The level of religiosity varies considerably according to socio-demographic indicators and with the territory. The proportion of believers (60.2% in Ukraine, in 2002) was the highest among women (68.1%), the elderly (64.6%), the less educated (72.5%) and rural people (67.3%), and the lowest among men (50.8%), the young (56.1%), people having completed higher education (53.1%) and urban dwellers (52.1%) (Bychenko, A. – Dudar, N. 2002).

Depending on geographical location, historical development, and the socio-demographic structure of the population, there are striking differences in the religiosity between the western and eastern regions of the country (similar to the ethnic features and political attitudes of the local population). The share of those who identified themselves as believers is 86.6% in the West, whilst this figure was only 50.5% in the East (according to Razumkov Centre, 2002). Religious and political-geographic factors also have an impact upon the sympathies of people, with regards to where they believe Ukrainian foreign policy should be targeted, in the case of

believers (B) and non-believers (NB): Russia B: 31%, NB: 43.9%; European Union B: 28.6%, NB: 15.4%; CIS countries B: 18.8%, NB: 19.6%; USA B: 4.7%, NB: 6.1% (Dudar, N. – Shanghina, L. 2002). The higher degree of religiosity (and lower degree of secularisation) in the western territories incorporated into Soviet-Ukraine between 1939 and 1945 can be attributed to the shorter period of aggressive and atheistic Soviet authority over these territories (ca. 45 years vs. 70 years in the East), and thanks to the massive presence of the centralised and particularly active Catholic churches in the West. This religious-geographic difference (together with the ethnic, cultural and political factors) is one of the major determinants of the future of Ukraine.

The overwhelming majority of Ukrainians are Orthodox Christians. The Eastern Christian (Orthodox and Greek Catholic) traditions have been and continue to be inseparable from their national identity, in the case of the majority of Ukrainians. In a survey of the Razumkov Centre (2002), 68.8% of those polled declared an affiliation with Orthodoxy, 6.9% with Greek Catholicism, 2.2% with Protestantism, 0.8% with Roman Catholicism, and 0.7% with Islam (*Table 6*). Considerable changes in the **confessional structure** of the population during the 20th century were a result of the dynamic increase in the ratio of secularised people, and the collapse of the large Jewish and Roman Catholic communities (the latter due to the holocaust and/or emigration of the majority of Jews and Roman Catholic Poles).

Today three major ***Ukrainian Orthodox churches*** coexist: the *Ukrainian Orthodox Church – Moscow Patriarchate* (UOC-MP), *Ukrainian Orthodox Church – Kyiv Patriarchate* (UOC-KP) and the *Ukrainian Autocephalous Orthodox Church* (UAOC). In 2002, out of the Orthodox population polled 53.2% declared itself "simply Orthodox", 23.8% as affiliated with the UOC-KP, 14.8% with the UOC-MP and 2.4% with the UAOC. Before 1990 all Ukrainian Orthodox communities were united in the Ukrainian Exarchate of the Russian Orthodox Church (ROC). Its legal successor, the *UOC-MP*, which remained linked with the ROC, concentrates two-thirds of Orthodox communities and the overwhelming majority of the Orthodox religious infrastructure (*Table 7*). The "heartland" of the pro-Russian UOC-MP is the eastern and southern, mostly Russophone part of the country. The UOC-MP is the only church recognised by the national Orthodox (e.g. Romanian, Bulgarian, Greek and Serbian) churches and by the Roman Catholic Church as a "canonical" (legitimate) one (Krindatch, A.D. 2005). Following the declaration of Ukrainian independence (1991) beside the UOC-MP, the newly created *UOC-KP* and the re-established UAOC as "real, independent, national" churches compete with each other for the support of the Orthodox Ukrainians. Although nowadays the influence of the UOC-KP, with its nationalistic-patriotic orientation upon Orthodox Ukrainians, is stronger than that of the UOC-MP's, it counts less than one quarter of the Orthodox communities and clergy in its flock. The most important hinterland of the Ukrainophone UOC-KP are the western (first of all, Volhynian) territories with their dominant ethnic Ukrainian character. The majority of the adherents to the relatively weak *UAOC* live in the areas mentioned above (mainly in Galicia). This church was founded in 1919 in Kyiv, and as a very patriotic Ukrainian church, was banned during the Soviet era (or rather between 1930–41, and 1945–1989).

The ***Ukrainian Greek Catholic (Uniate) Church*** (UGCC) of Byzantine rite is the largest of the Eastern Catholic churches. The UGCC and the *Ruthenian Greek Catholic Church* (RGCC) recognise the supremacy of the Pope in the Vatican, but their lithurgical tradition is similar to the Orthodox churches. The existence of the UGCC and RGCC are rooted in the unions of Brest (1596) and Ungvár (today Uzhhorod, 1646) when groups of Ukrainian–Ruthenian Orthodox bishops of the Catholic dominated Polish–Lithuanian Commonwealth and Hungary, joined the Catholic Church. The

Table 6. ***Confessional structure of the population on the present-day territory of Ukraine (1897/1900 and 2002; in %)***

	1897/1900	2002
Orthodox	69.8	68.8
Greek Catholic	10.6	6.9
Roman Catholic	6.3	0.8
Protestant	1.5	2.2
Jewish	9.1	0.1
Islamic	0.7	0.7
Other churches	2.0	0.2
Without religious affiliation	0.0	20.3
Total population	100.0	100.0

Source: 1897/1900 (census data): Chornyi, S. 2001; Eberhardt, P. 1994; 2002 (sociological survey): Bychenko, A.–Dudar, N. 2002.

Table 7. ***Religious denominations in Ukraine (1 January, 2006)***

Organisations	Communities	Monasteries	Monks and nuns	Pastoral ministers	Educational institutions	Number of students	Sunday schools
All religious organisations	**30,941**	**386**	**6,132**	**28,431**	**171**	**20,448**	**12,522**
Orthodox churches	***15,938***	***205***	***4,296***	***12,701***	***40***	***5,973***	***5,550***
Ukr.Orth.Church – Moscow Patriarchate	10,875	161	4,083	9,072	16	4,454	4,019
Ukr.Orth.Church – Kyiv Patriarchate	3,721	36	198	2,816	16	1,260	1,153
Ukr.Autocephalous Orthodox Church	1,166	6	13	686	7	241	349
Catholic churches	***4,340***	***176***	***1,831***	***2,647***	***23***	***2,403***	***1,754***
Ukr.Greek Catholic Church	3,443	93	1,216	2,136	16	1,716	1,198
Roman Catholic Church in Ukraine	877	83	615	499	7	687	553
Protestant churches	***8,826***			***11,631***	***94***	***11,327***	***4,864***
Pentecostal and Charismatic churches	3,369			4,203	34	2,414	1,821
Baptist and Evangelical Christian churches	2,980			3,682	53	8,222	1,744
Adventist churches	1,060			1,203	3	473	734
Jehovah's Witnesses	987			2,100			311
Calvinist churches	173			129			137
Church of Christ	106			147	2	198	59
Lutheran churches	93			78	2	20	39
New Apostolic Church	58			89			19
Muslim organizations	***1,076***			***456***	***7***	***284***	***5***
Judaic organizations	***255***			***166***	***7***	***190***	***26***
Buddhism	***48***	***1***	***5***	***35***			***2***

Source: http://www.risu.org.ua

UGCC (historical name: "Ecclesia Ruthena unita") played a leading role in the development and protection of Ukrainian identity on the territory of the Hapsburg (Austro–Hungarian) Empire until 1918. The UGCC was broken up in Galicia, Volhynia in 1946, as the RGCC was in Transcarpathia in 1949 by the Soviet regime. They survived during the Soviet period as banned, underground churches and were re-established in 1989. The Greek Catholic churches were also closely related to the Ukrainian national and independence movements. Following their rehabilitation they remained as regional churches with their main hinterlands in Galicia (UGCC) and Transcarpathia (RGCC).

The ***Roman Catholic Church*** in Ukraine (RCC) is traditionally associated with the Polish minority (and in Transcarpathia with Hungarians). The RCC with its archidiocesan seat in L'viv uses the Polish, Latin, Ukrainian and Hungarian languages, and is mostly active amongst the Polish diasporas of the western territories and in the Hungarian settlement area.

Protestantism in present-day Ukraine is rooted in the 16th century, due to Calvinist Hungarians in Transcarpathia and to the Anabaptists in Volhynia. The considerable spread of protestantism in ethnic Ukrainian areas was a result of the large-scale colonisation of Lutheran Germans in Volhynia, South Bessarabia, in the steppes and in Crimea during the 18th and 19th centuries. By the mid-20th century, with the emigration of Germans, Protestants virtually disappeared from Ukraine (excluding the Calvinist Hungarians in Transcarpathia). Over the past two decades, the number of Protestant communities have grown rapidly in the urbanised, previously Orthodox, and later heavily secularised areas due to their active missionary profile and to the fact, that masses of people with Orthodox roots became tired of inter-confessional conflicts within Orthodox

churches. Instead of large, historical churches they have been looking for smaller, charismatic religious communities. Despite concentrating only 2.2% of the total population, the Protestants constitute 28.5% of all religious organisations in the country. The most influential and authoritative are the *Pentecostal* and *Charismatic* churches (3,369 communities), the *Baptist* and *Evangelical Christian* churches (2,980 comm.), the *Adventist* churches (1,060 comm.), *Jehovah's Witnesses* (987 comm.) and the *Hungarian Reformed* (Calvinist) Church in Transcarpathia (173 comm.) (*Table 7*).

Islam is also an indigenous religion in Ukraine due to the Crimean Tartars, whose return from exile in Central Asia accelerated after 1991. During the last half of the century many people of a Muslim religious affiliation migrated from the former USSR and Asia (e.g. Tartars, Azeri, Chechens and Arabs). The number of Muslim communities increased between 1991 and 2006 from 14 to 1,076. The majority of Ukrainian Muslims are Crimean Tartars, whose share is 12% within Crimea's population.

The number of Ukrainian ***Jews*** is estimated at 100,000–300,000, but was 2.7 million around 1930. In 2006 there were 255 Jewish communities, mostly in the regions of Transcarpathia, Chernivtsi, Poltava, Sumy, Cherkasy and Vinnytsia.

Demographic Features

With 46.5 million inhabitants (as of 01/08/2007) Ukraine is Europe's 6th, and the world's 27th most populous country. During the 20th century the general trend of **population growth in Ukraine** was broken by the two world wars, the artificially engineered famine of 1932–33 and forced migration, which cumulatively resulted in a serious demographic loss estimated at around 12 million people. It was only in 1959 that the population number managed to recover to pre-war levels (*Table 8*). However, behind a general trend in population growth, following World War II there has long been a simultaneous trend showing a weakening increase, and net migration. For instance, during the first post-war census period (1959–70) there was 12.6% growth, followed by 5.6% during the second one (1970–79) and diminishing further (3.9%) in the third period (1979–89). The reduction in population growth from the 1960s was an international trend in Europe and the USSR (excluding Turkey and the Soviet republics with a Muslim cultural background), and arose from the narrower generation reproduction (*Figure 29*). In the 1990s an abrupt change in population dynamics occurred in Ukraine. After reaching an all-time maximum population number in 1993 (52.2 million), it dropped by 5.7 million between 1993 and 2007. Three-quarters of this loss is attributed to a natural population decrease and one-quarter as a result of the negative migratory balance. Relative to the figures in 1989, Ukraine lost 9.7% of its population. Similar losses could be observed in Romania (-7%) and Bulgaria (-12%), which were less catastrophic than the trends observed in Latvia, Estonia and Georgia (-16 – -20%). During the same period considerable population growth characterised – mainly due to mass immigration – the developed EU countries (5–10%), along

Fig. 29

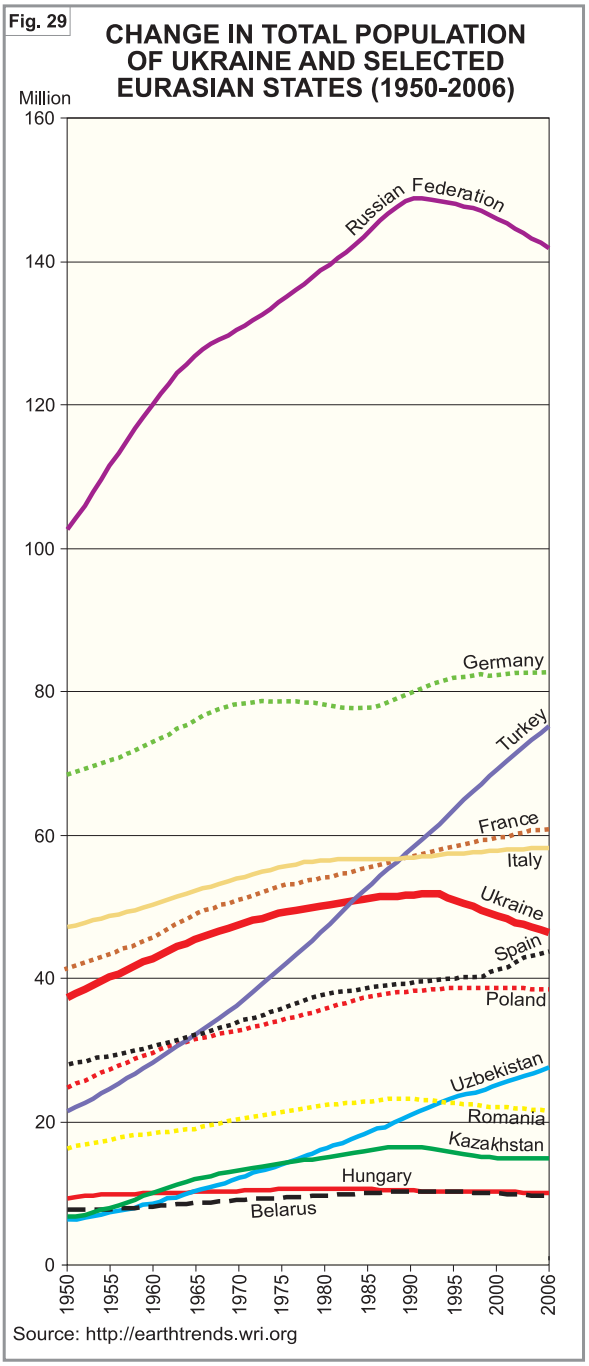


Table 8. ***Change in the population number on the present-day territory of Ukraine (1897–2007)***

Year	1897	1913	1926	1939	1950	1959	1970	1979	1989	2001	2007
Population number (million persons)	28.4	35.2	37.8	40.5	37.3	41.9	47.1	49.6	51.5	48.2	46.5

Source: www.ukrstat.gov.ua

with Turkey and the post-Soviet Muslim states (due to the high crude birth rate) (20–40%).

Current demographic processes in Ukraine are characterised by highly unfavourable trends. Their analysis suggests that there is an early origin to this tendency. Already in the second half of the 1920s crude birth rates were showing decline within the rural population, by 1979 having turned into outright depopulation of these areas. This tendency has spread into the national statistics for Ukraine as a whole since 1991. Thus, worsening socio-economic conditions in the 1990s – when the positive effects of a previously favourable age-structure ceased to support population growth in most regions – were not the trigger; they only intensified negative demographic trends. Population growth between 1989–2001 could only be observed in some raions, due to natural population increase (e.g. in Hutzulschina, Bukovina and in some raions of Volhynian Polissia) and due to a positive migratory balance (e.g. as a result of the returning Tartarians in Crimea) (*Figure 30*). Since the census of 2001, the population of all regions of the country (excluding Kyiv City) is decreasing, but to a different extent. While the western areas (Transcarpathia, Galicia and Volhynia) with a traditionally high fertility rate could almost maintain their 2001 population level (yearly -0.2 – -0.3% decrease), the central regions around Kyiv with a high mortality rate have experienced a yearly loss of 0.9 – 1.2% of their population.

This reduction in the population number since the census 2001 has mostly resulted from unfavourable developments in the natural rate of population change (*Figure 31, Table 9*). The first post-war fall in the crude ***birth rate*** started in the period 1950–1955, according with general European trends (*Figure 32*). Its level stabilised between 1965 and 1985 at around 15%, which is equal to a total *fertility rate* of about 2.0 (children per woman). During this period about 700,000 – 800,000 live births were registered yearly. It meant that the majority of pregnancies were unwanted, arising from neglecting to use contraceptive methods. From the middle of the 1980s onwards, the birth and fertility rate fell again, the decline of which was aggravated by worsening economic conditions and the decline in living standards of the population during the

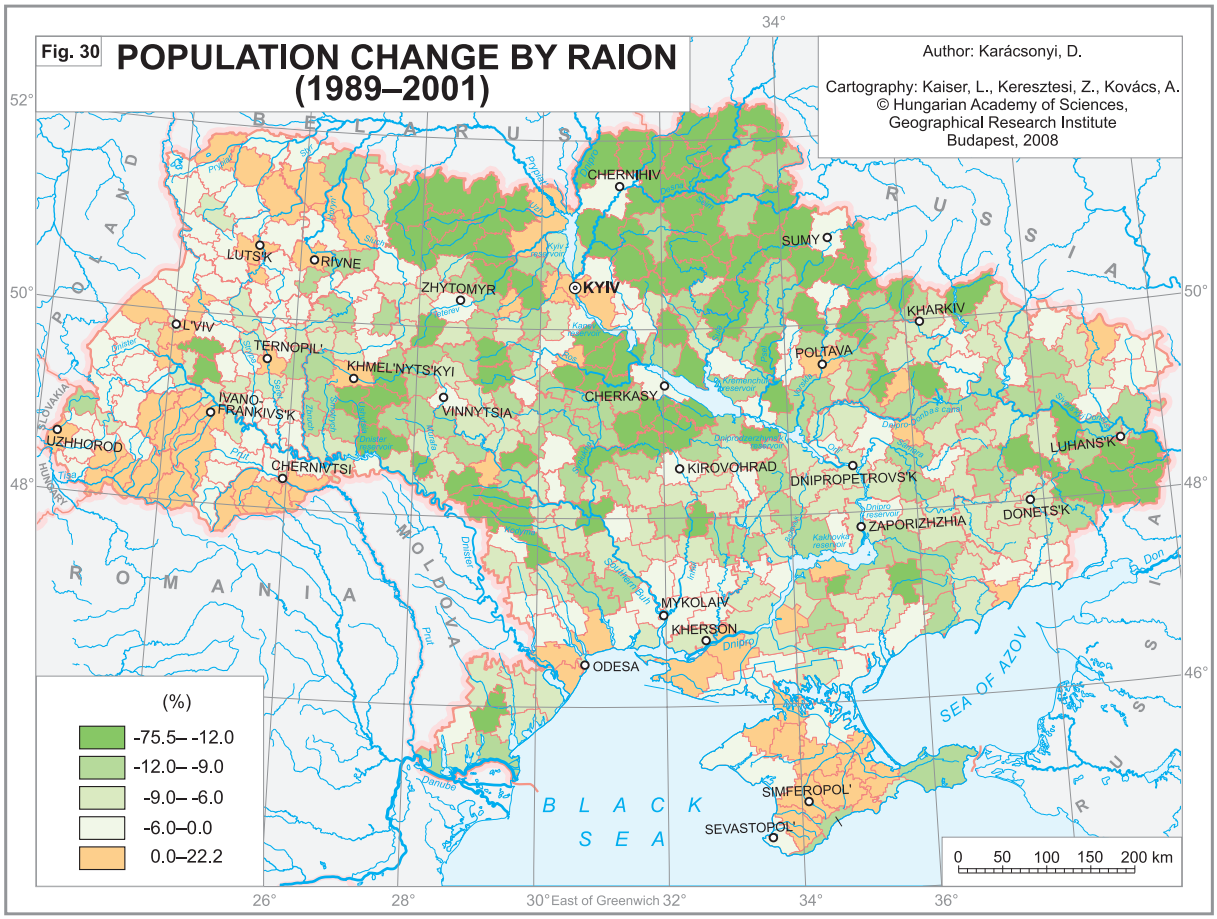
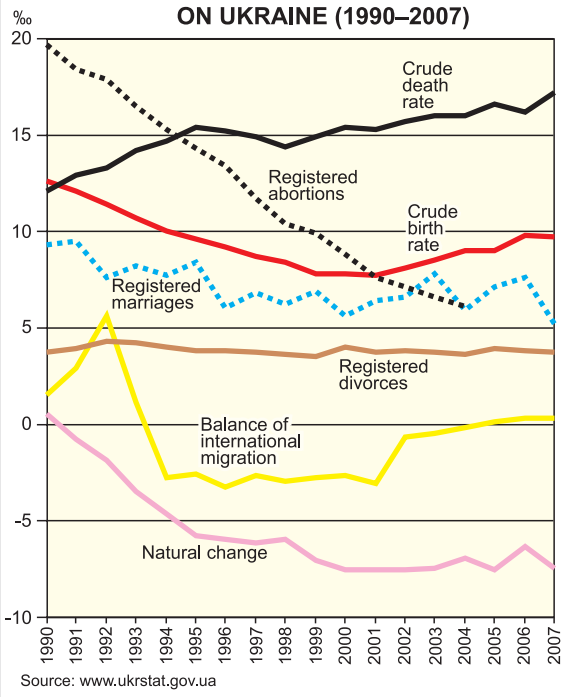


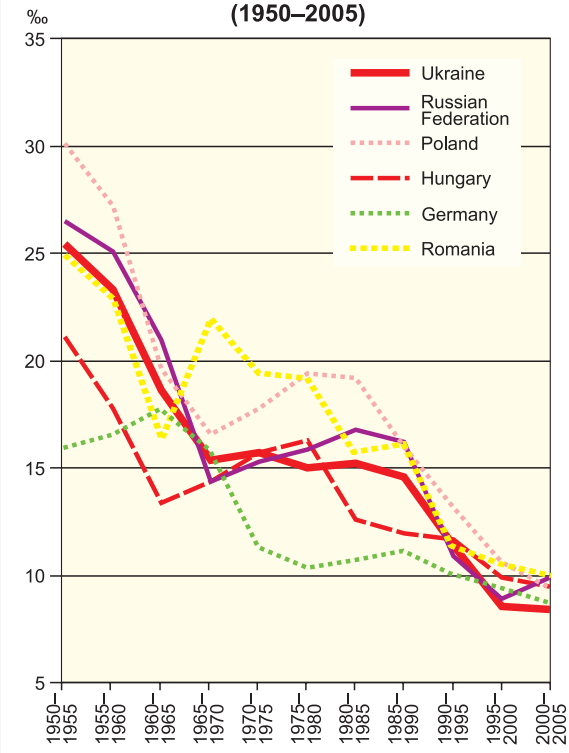
Fig. 31 SELECTED DEMOGRAPHIC INDICATORS ON UKRAINE (1990–2007)



Source: www.ukrstat.gov.ua

1990s. The crude birth and total fertility rates reached their lowest level (7.7% and 1.1 children per woman) in 2001, after which, due to positive developments in the economy and society,

Fig. 32 CRUDE BIRTH RATES IN UKRAINE AND IN SELECTED EUROPEAN STATES (1950–2005)



Source: http://earthtrends.wri.org

a moderate but continuous fertility increase started, culminating in a 9.7% birth rate in 2007. These days the highest crude birth rate level (11–13%) can be observed in the western territories (dominated by a more conservative population that is deeply motivated by issues of ethnicity and religion, in part by the Catholic Church), in Galicia, Transcarpathia and in Volhynia. Due to an expansion in contraceptive services and other factors, the annual number of abortions recently fell to a quarter of a million, which represents barely more than half of the rate for live births. According with the facts mentioned above, it is understandable that the ratio of abortions, that of unwanted pregnancies, and of births to unmarried couples is about four times higher in the more urbanised, secularised East (e.g. Donbas) than in the West (e.g. Galicia, Transcarpathia).

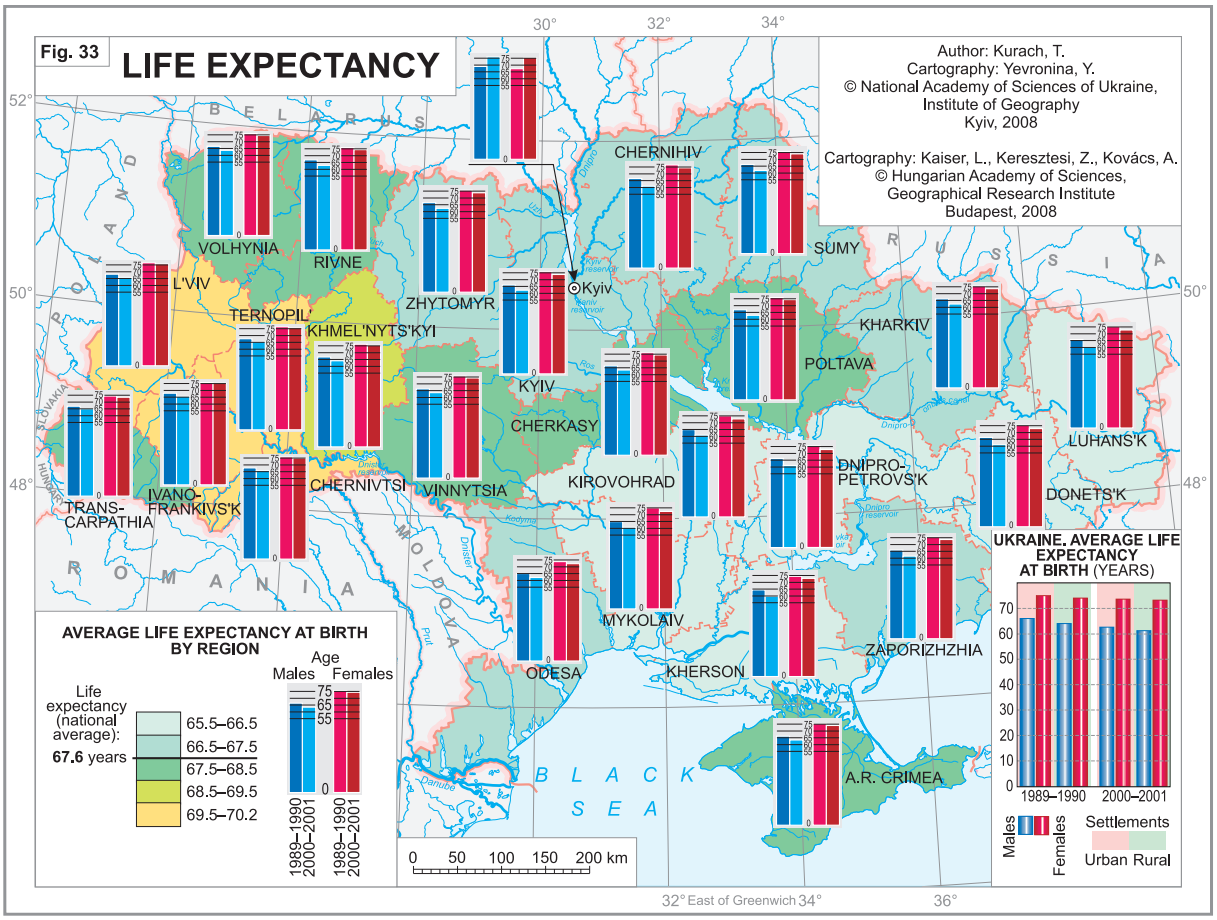
During the 1990s, falling birth rates were accompanied (in contrast to developed countries) with a decreasing average *life expectancy at birth.* According to WHO data, life expectancy is 10.9 years shorter in Ukraine than amongst the EU member states. This figure for women is 11 years longer than that of men (*Table 9*) and it is the longest in the western areas with the highest fertility rate, mentioned above (*Figure 33).*

The main cause of the present-day natural population decrease is that the crude ***death rate*** started to increase from the 1960s onwards. Since then, mortality has increased – similarly to Russia – from 8.2% to 17.2% (2007), which represents one of the highest figures in Europe (*Figure 34).* As in Russia following the Gorbachev anti-alcohol campaign (from 1985) the mortality ratio decreased, while after economic liberalisation in 1991 (resulting in widely available and cheaper alcohol) this ratio significantly increased. While an increase in the death rate has been recorded amongst all age groups, its level among working-age (especially 30–45 year old) men is the highest in Europe due to their worsening health and self-destructive lifestyle originating from increasing social stresses. The main causes of death in 2003 were connected with diseases of the circulatory system (59.7%) and cancer (12%). The crude death rate peaked at 19–23% in the hinterland-regions of Kyiv (e.g. Chernihiv, Poltava, Sumy, Cherkasy and Zhytomyr), which is a significant contrast to Kyiv City and the western areas with their high fertility rate (with the lowest crude death rate at 12–16%). The *infant mortality rate,* which decreased between the

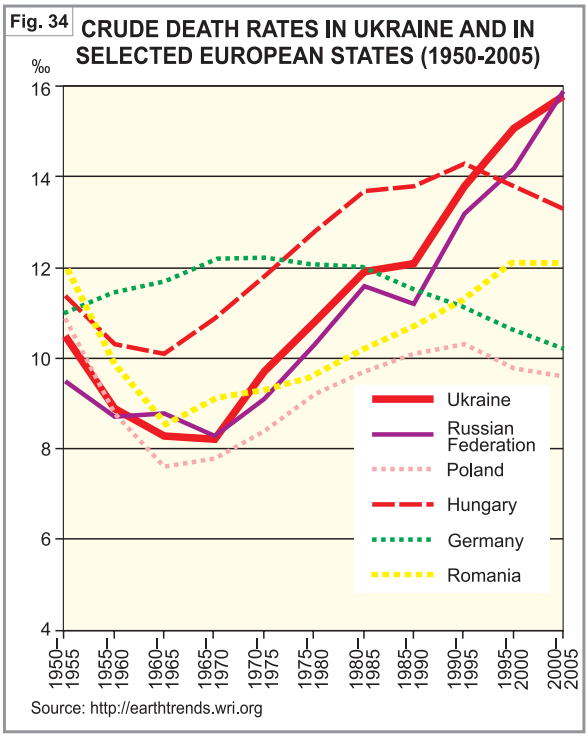
Table 9. ***Selected demographic indicators of Ukraine (1990–2007)***

Years	Crude birth rate	Crude death rate	Natural increase/ decrease	Balance of internal migration	Registered			Ratio of population		Ageing index	Life expectancy at birth		
					Marriages	Divorces	Abortions	aged 0–14	aged 65 and over		Both sexes combined	Male	Female
	per 1,000 inhabitants							in %			in years		
1990	12.6	12.1	0.5	1.5	9.3	3.7	19.7	21.4	12.3	57.5			
1991	12.1	12.9	-0.8	2.9	9.5	3.9	18.4	21.2	12.6	59.6	69.3	64.2	74.2
1992	11.4	13.3	-1.9	5.6	7.6	4.3	17.9	21.0	12.9	61.4	68.7	63.5	73.7
1993	10.7	14.2	-3.5	1.1	8.2	4.2	16.5	20.8	13.3	63.9	68.0	62.8	73.1
1994	10.0	14.7	-4.7	-2.8	7.7	4.0	15.3	20.5	13.6	66.3	67.2	61.8	72.7
1995	9.6	15.4	-5.8	-2.6	8.4	3.8	14.3	20.1	13.8	68.9	66.9	61.4	72.6
1996	9.2	15.2	-6.0	-3.3	6.0	3.8	13.4	19.7	13.9	70.8	67.4	61.9	72.9
1997	8.7	14.9	-6.2	-2.7	6.8	3.7	11.7	19.2	14.0	73.0	68.1	62.7	73.5
1998	8.4	14.4	-6.0	-3.0	6.2	3.6	10.4	18.5	13.9	74.9	68.3	62.9	73.7
1999	7.8	14.9	-7.1	-2.8	6.9	3.5	9.9	17.8	13.8	77.4	67.9	62.4	73.5
2000	7.8	15.4	-7.6	-2.7	5.6	4.0	8.8	17.2	14.0	81.2	68.3	62.8	74.1
2001	7.7	15.3	-7.6	-3.1	6.4	3.7	7.6	16.5	14.5	87.8	68.3	62.7	74.1
2002	8.1	15.7	-7.6	-0.7	6.6	3.8	7.1	15.8	15.1	95.5	68.2	62.6	74.1
2003	8.5	16.0	-7.5	-0.5	7.8	3.7	6.6	15.8	15.0	95.0	68.2	62.6	74.1
2004	9.0	16.0	-7.0	-0.2	5.9	3.6	6.1	15.3	15.5	101.7	68.0	62.2	74.0
2005	9.0	16.6	-7.6	0.1	7.1	3.9		14.8	15.9	107.4			
2006	9.8	16.2	-6.4	0.3	7.6	3.8		14.5	16.2	111.9	70.0	64.7	75.6
2007	9.7	17.2	-7.5	0.3	5.2	3.7							

Remark: 2007 (first half)
Source: www.ukrstat.gov.ua



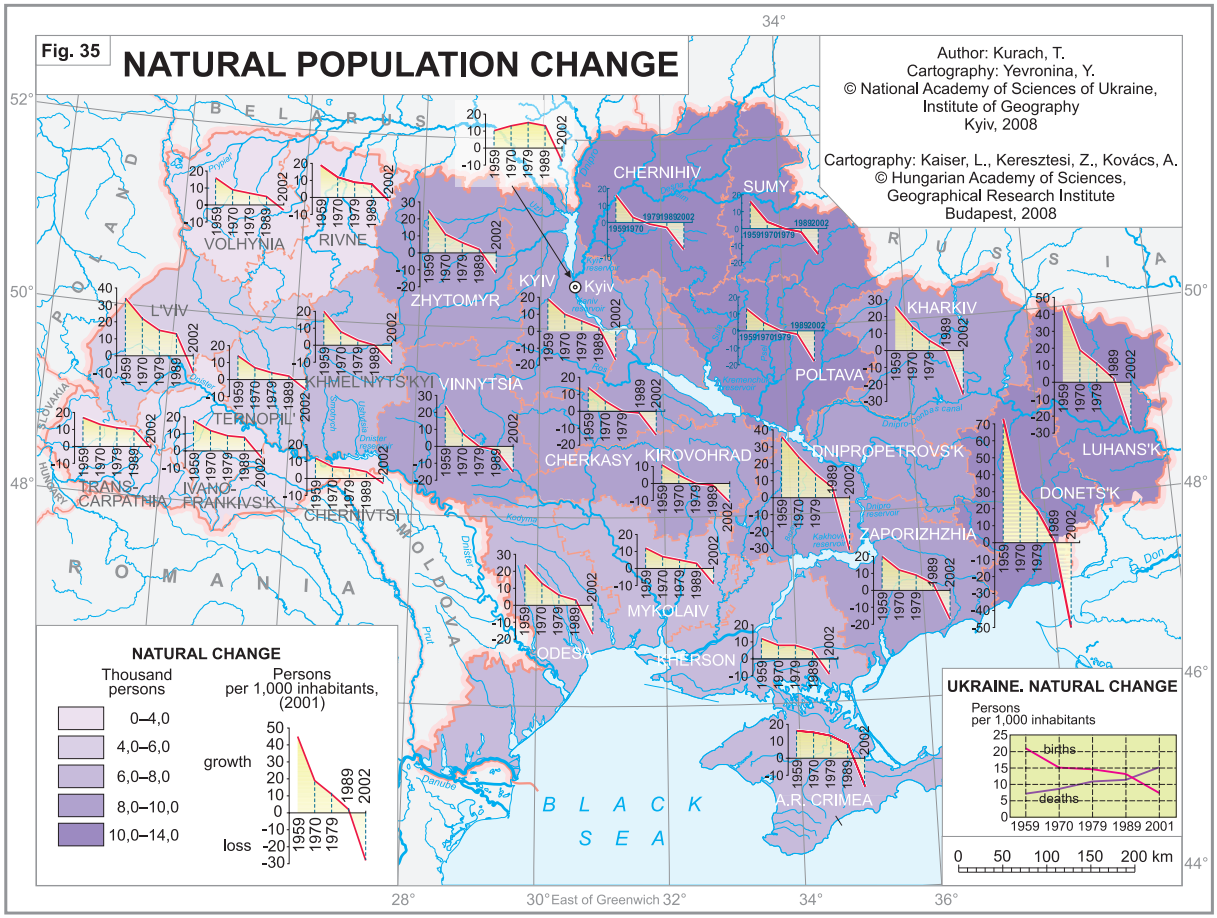
early 1950s until today, from 85% to 10.7% represents an average between Hungary, Poland (at ca. 7%) and Romania, Russia (ca. 17%). This rate is at its highest (13–14%) in the eastern, mostly industrialised areas (e.g. Donets'k, Luhans'k and Zaporizhzhia).

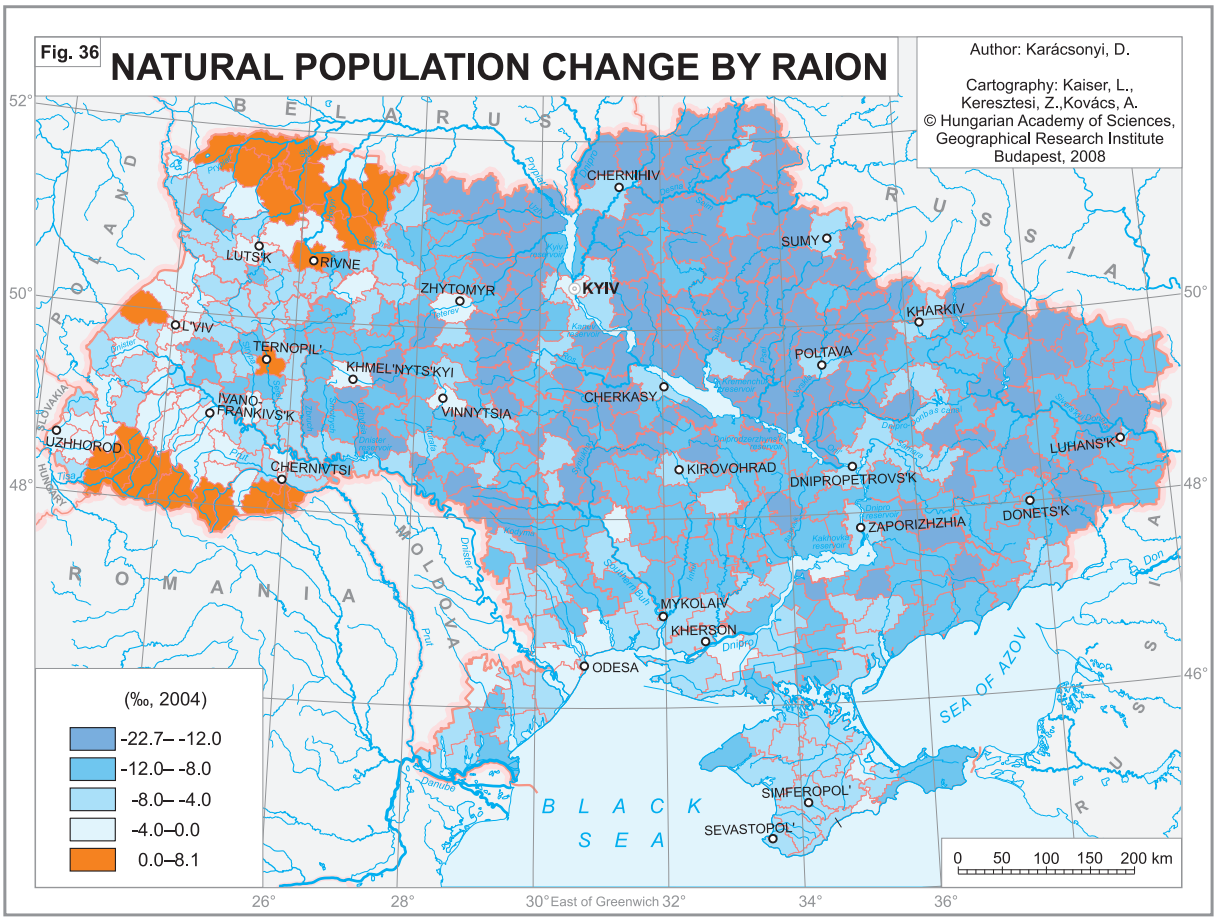


There is a close relationship between mortality patterns and the *health* state of the population, which was formed by the impact of medical-demographic circumstances of the 1950 and 60s, having left their imprint on the subsequent situation. In the 1980s over 15% of adults and more than 20% of children suffered from diseases. By the 1990s this turned into a medical-demographic crisis. The state of the healthcare system is deteriorating, the number of medical establishments is decreasing and due to the transition of treatment towards a pay-for-care system, the majority of the population has only limited access to healthcare (Shangina 2004). Indicators of this crisis are phenomena such as the growing rate of premature mortality and morbidity, a widespread distribution of chronic diseases, negative shifts in the dynamics and structure of disorders, the swift spread of specific new harms and diseases (AIDS, narcotics) and a re-emergence of those that were previously almost eradicated (tuberculosis and other epidemics).

In 1991, the balance of the crude birth and death rate turned, from a natural increase into a ***natural decrease*** in the population and has been stable in its ratio since 2001 at around 7.6% per year due to the parallel increase in fertility and mortality. The natural decrease is the lowest (1.2–3.7%) in the western regions, where the natural population increase was sustained the longest (e.g. Rivne until 1994, Ivano-Frankivs'k until 1995 and Transcarpathia until 1998). As a result of the lowest fertility rate, paired with the highest mortality ratio the natural decrease reached a particularly alarming level (-11 – -16%) in the Donbas area and in the Left-Bank in Ukraine (e.g. Chernihiv, Sumy and Poltava oblasts) (*Figure 35)*. Even in 2004 fertility exceeded mortality in the raions of Volhynian Polissia and Eastern Transcarpathia (*Figure 36*).

During the last century, the growth and structure of the population of Ukraine was heavily affected by migration. ***Internal migration,*** which has had a profound impact on the population density of regions, was rather intense in Ukraine during certain phases in its historical development. These were mainly periods of resettlement involving huge portions of the rural population, to urban centres and industrial areas especially in the Donbas region, along the Dnipro river and in the coastal areas of the Black Sea. In the 1970s the annual average number of people settling in cities and towns amounted to 300 thousand, predominantly arriving from villages. In 1986, the evacuation and resettlement from the 30 km zone affected by the Chernobyl' nuclear power plant disaster represents a special case of internal migration. Within this belt, residents have left 71 rural and several urban settlements. The accident's survivors were mostly evacuated from Prypiat' to the new town, Slavutych founded in 1986. Since the 1990s, the intensity of rural–urban migration has decreased and internal migration has lately been dominated by resettlement to Kyiv, the capital city; two thirds of migratory loss from oblasts is due to migration of this type. Recently (2006) only 3.08% of the population embarked on internal migration (between the regions). The most popular destinations for internal migrants are Kyiv (+8.9% migratory increase) and its region, in addition to the oblasts of Kharkiv, Crimea and





Dnipropetrovs'k (+0.4 – +1.4%). The main source regions of internal migrants moving to Kyiv are Vinnytsia, Zhytomyr, Sumy and Kirovohrad (with -1.5 – -4.4% migratory losses in 2006).

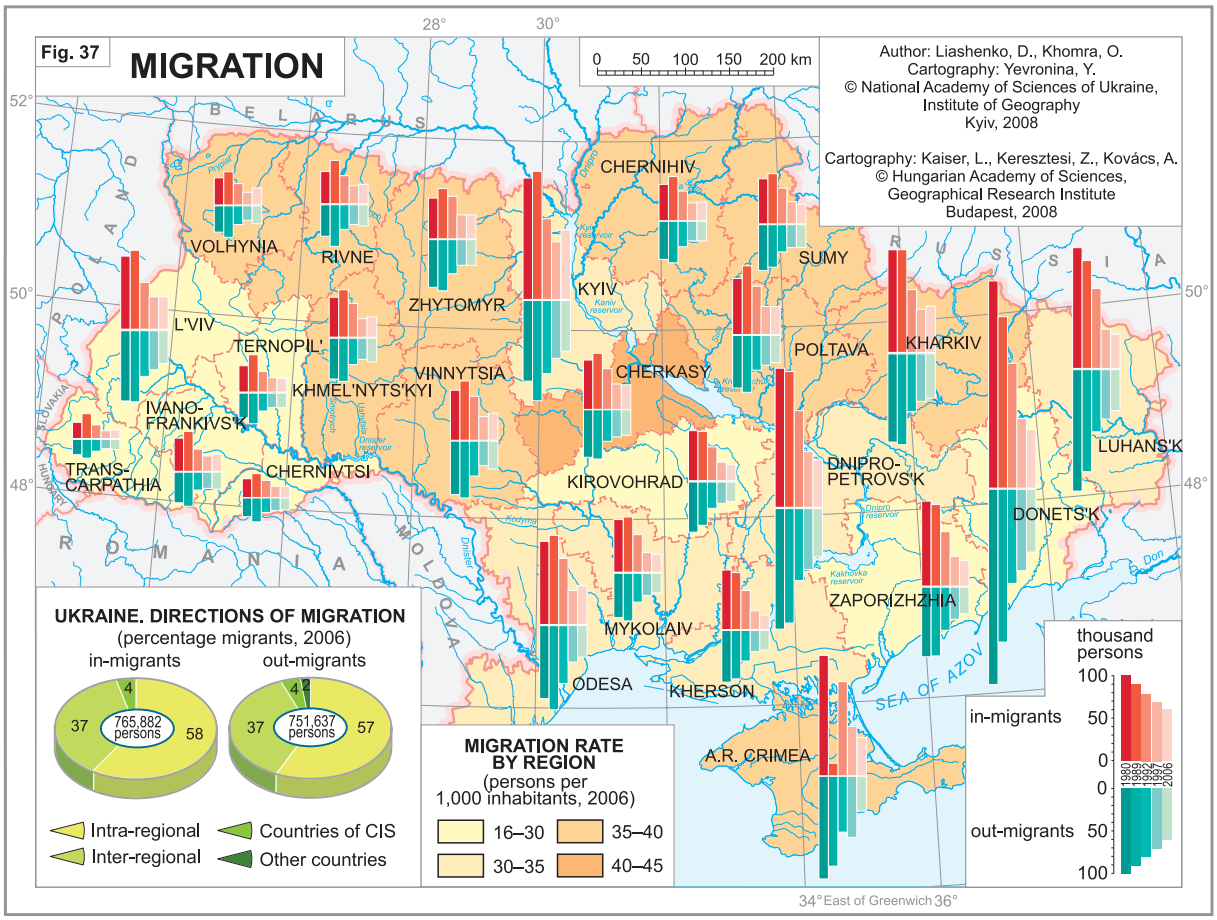
External migration, crossing the present-day Ukrainian borders during the Soviet period until the 1950s, was characterised by the state-resettlement of people (mostly Russians) in order to form new workforces, along with the deportation of politically "unreliable" ethnic groups (e.g. Crimean Tartars, Germans and sometimes tens of thousands of Ukrainians). Later, migration (at that time internally within the Soviet Union) for employment reasons became voluntary and of an ad-hoc nature. Younger generations were recruited and moved to Russian Siberia and the Far East, at best returning as pensioners, which considerably altered the Ukrainian demographic structure. Following the collapse of the USSR (1991) people from the former Soviet states (along with the deported, later rehabilitated ethnic groups: e.g. Crimean Tartars and Germans) started to return to their homeland regions. Despite this "return-migration" having a notably Russian flavour, culminating in 1992 it was to serve as a migration surplus for Ukraine until 1993. Due to economic–political instability, the spread of unemployment, the hyperinflation of 1991–1993, the dramatic decrease in personal incomes and the exceptionally low price of labour in Ukraine, the emigration of Ukrainians dramatically increased and was not only in the direction of the post-Soviet space. Between 1994 and 2004, the population of Ukraine suffered an officially recorded migratory loss of 1.22 million persons. According to the estimations of Ukrainian embassies, 2–3.5 million Ukrainians are working abroad (most of them illegally): around one million in Russia, 300,000 in Poland, 200,000 each in Italy and the Czech Republic, 150,000 in Portugal and 100,000 in Spain. Besides the emigration of Ukrainians, there is also considerable outward migration amongst certain ethnic groups (e.g. Russians, Jews, Germans, Hungarians and Greeks). Since 2005, the balance of external migration into the country is again positive due to a moderate rise in the global appeal of Ukraine, which has resulted in a decrease in emigration and a slight increase in immigration (partly from Russia,

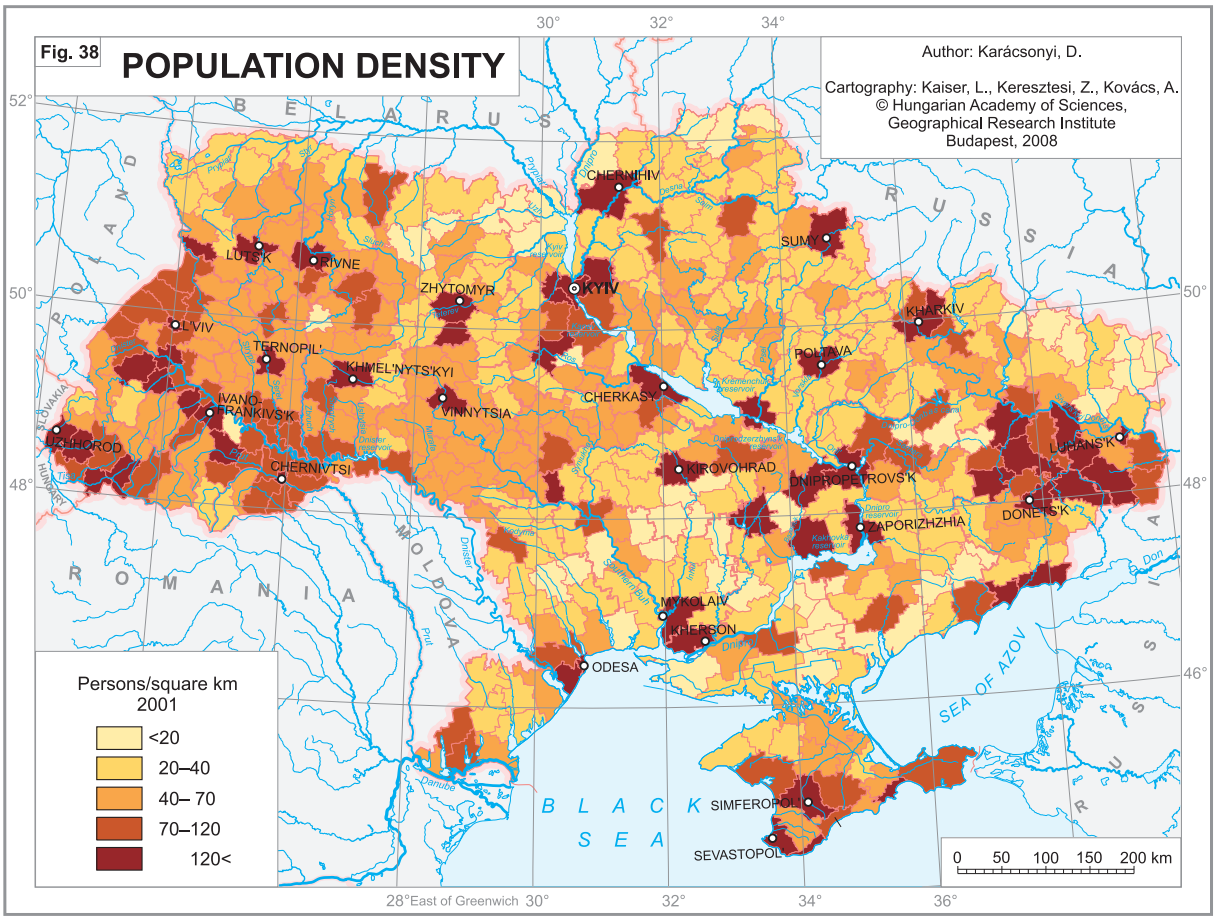
Moldova, Transcaucasia, and third-world countries). According to official statistics, the total volume of (internal and external) migration in the regions of Ukraine is decreasing since 1989 (*Figure 37*). These days, the least mobile are the populations of the western areas (Galicia, Transcarpathia), in contrast to the hinterland regions of Kyiv and Crimea.

The present-day distribution of the population in Ukraine is a product of social-economic development and, at particular times, of physical-climatic conditions and ethnic-historical traditions. The average **population density** has decreased in parallel with the total population of the country: in 1993, there were 87 persons per square km, whilst in 2001 this figure was 80, and in 2007, 77. Of the regions, Donets'k oblast has the highest value (172 pers./sq. km) and Chernihiv oblast has the lowest density (36 pers./sq. km). The least densely inhabited rural areas of the country (below 40 pers./sq. km) are the regions (primarily the Steppes) which were colonised the last (in the 17–19th centuries). At the same time the highest population density (above 80 pers./sq. km) can be observed in the western areas (Galicia, Bukovina, Transcarpathia), with settlement primarily on the plains and low hilly regions, in proximity to the Dnister, Prut and Tisa rivers (*Figure 38*).

The **sex and age structure** of the population as a demographic and economic phenomenon has an impact on the reproductive and labour potential of society. Following large losses amongst the male population during the wars, the ratio of ***men to women*** (taken for one thousand women) grew during the period 1959–1989 (1959: 797; 1989: 857 men/1,000 women). The figures witnessed a slowing-down in this improvement during the 1990s due to the extreme increase in mortality, decrease in fertility and the gradual ageing of the population (2001: 861; 2006: 860 men/1,000 women). These days the most balanced ratio between the sexes (890–930 men/1,000 women) is characteristic of the western areas (Transcarpathia, Galicia and Volhynia), whose demographic situation is the most favourable.

An ***ageing*** of the population and the increase in the ratio of elderly people is one of the most significant demographic phenomena in





Ukraine. The proportion of children aged 0–14 years decreased during the period 1950–2006 from 27.2% to 14.5%. At the same time the ratio of persons aged 60 and more increased from 10.9% to 20.6%, and of those aged 65 or more from 7.6% to 16.2%. There is a striking difference as to the extent of ageing between urban and rural areas. The proportion of population aged 60 years and over was 19.1% in the former and 26.1% in the latter at the time of the last census (2001). Due to general ageing of the population, the considerable increase in the death rate amongst working-age people (mainly amongst men) and the decrease in fertility, the present-day Ukrainian age pyramid is characterised by a widening of its upper section and sharp narrowing of its lower section. The most "healthy" age structure also encompasses the "youngest" regions by population: Transcarpathia, Rivne and Chernivtsi oblast due to their favourable demographic attributes mentioned above.

In Ukraine there are relatively stable traditions of **marriage and family life**; ca. 90% of citizens live in family units. Nevertheless, the social-economic and demographic crisis of the 1990s (with their triggers tracing back to the 1960s) has led to a rising postponement of marriage and birth of children, a growing rate of extra-marital births and social orphanage, and a high occurence of divorce. Unmarried, cohabiting couples are becoming ever more frequent. As a consequence of the crisis in married and family life, there is a widespread phenomena of single-parent families (19.3% in urban settlements); a growing ratio of children born out of wedlock (mothers of 34.1% of children born to women younger than 20 years of age, are unmarried); and a massive spread of childless and single-child marriages (where two thirds of families with children under 18 years have only one child). These changes in the marital and family status of the population are a manifestation of the setting-up of a new type of population reproduction in the market environment (Kuras – Pirozhkov 2004). During the period between 1989 and 2001 the ratio of married persons aged 16 years and over decreased; in the case of men from 74.3% to 66.3%, whilst amongst women this fell from 60.6% to 55.2%. This marital status index is the lowest in the eastern

and southern regions (e.g. Kharkiv, Luhans'k, Donets'k, Dnipropetrovs'k, Zaporizhzhia and Crimea), which played host to the main arenas of Socialist industrialisation and urbanisation, and were characterised by high social and territorial mobility, a high rate of marriages and divorces and hence, high marital instability. The stability of families and marriages is the highest in the more traditional western territories that are deeper motivated by issues of ethnicity and religion (e.g. Transcarpathia, Galicia, Bukovina and Volhynia). This fact is also manifested in the high demographic vitality of these regions.

The Ukrainian population traditionally has a high **level of education**. All censuses following the Second World War testify to its continuing improvement. Based on records for the first Soviet census after the Second World War (1959), the mean duration of schooling for persons aged 10 years and over was 5.05 years, having grown to 10.3 by 2001, the figure for which was one of the highest in the world (*Table 10*). Additionally, according to indicators of educational attainment for the population aged 15 years and over, Ukraine is ahead of not only the post-Communist states but of the majority of developed countries in the world. 34% of people older than 14 years possessed (complete, incomplete or basic) higher education at the time of the 2001 census. The same value in the USA's case was 48.1%, Russia 19.1%, Germany 16.1% or Poland 10.2%. There is a specific feature amongst the educational statistics of Ukraine: women are educated to a higher level than men and this pattern can be identified in each age bracket up to 60 years old. Levels of education amongst the rural and urban population differ considerably. The ratio of those with higher education, for persons aged 10 and over, is more than twice as high amongst urban dwellers than within the rural population (37.9% and 17.7%, respectively). As a result, the highest levels of education are connected with the big cities and most urbanised areas in general: Kyiv, Sevastopol', Kharkiv, Dnipropetrovs'k, Odesa, etc. (*Figure 39*). In contrast to these regions, the population of western Ukraine (first of all Transcarpathia, Bukovina and Volhynia) had the lowest educational attainment in the 2001 census.

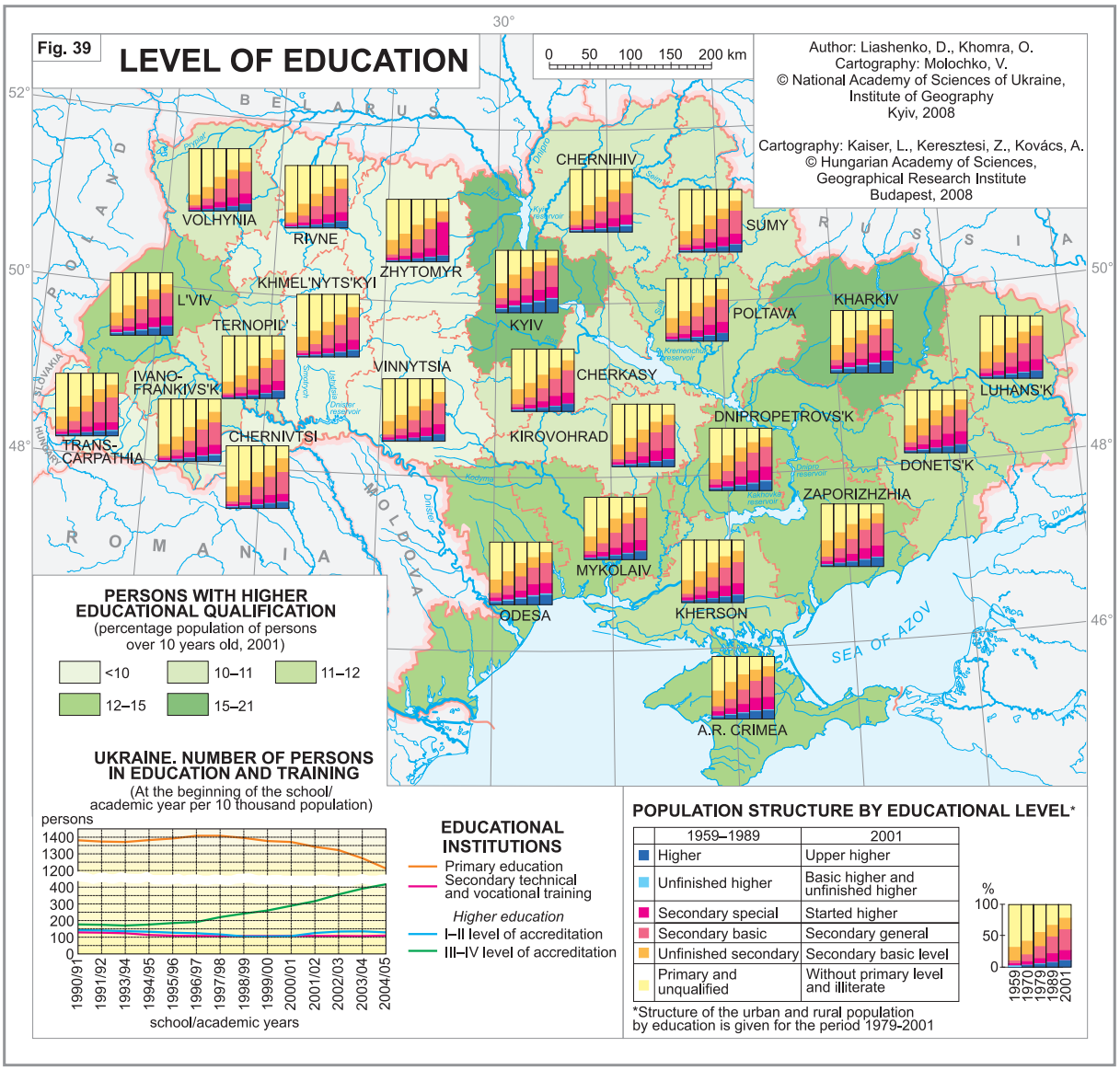
Despite overall positive trends in macroeconomic indicator values in the Ukrainian economy between 1999 and 2006, **employment** (as the economic basis of social welfare) continued to shrink. Its expansion since 2006 can be attributed to the growth of self-employment. Although the rate of unemployment (measured by ILO methodology) had decreased by 33% between 2000 and 2006, it remained high (9.1%) even by the end of this period.

The Ukrainian labour market still faces severe issues, such as gender discrimination, youth unemployment and the lack of availabil-

Table 10. ***Educational attainment of the total population aged 15 and over in Ukraine and in selected countries of the world***

Country	Year	Highest education level attained			Average duration of schooling
		Post-Secondary level	Secondary level	Primary level	
		Percentage of the population aged 15 and over			
UKRAINE	2001	34.0	55.2	7.9	10.32
United States	2000	48.1	42.9	8.2	12.05
Japan	2000	22.2	50.1	27.5	9.47
United Kingdom	2000	19.6	41.7	35.4	9.42
Russian Federation	2002	19.1	57.3	21.5	10.03
France	2000	17.3	35.7	46.2	7.86
Germany	2000	16.1	61.4	18.6	10.20
Austria	2000	14.7	57.0	25.5	8.35
Hungary	2000	12.1	41.7	43.9	9.12
Poland	2000	10.2	53.7	34.1	9.84
Romania	2000	7.3	68.0	20.5	9.51
China	2000	2.8	45.3	33.9	6.35

Source: www.ukrcensus.gov.ua
http://devdata.worldbank.org



ity of jobs for people having completed higher education. The employment level for men was 60.3% and 52.6% among women, and average pay for females was 68.6% lower than for men.

During the first years of the 21st century, economically active people amounted to more than 22 million of the population aged between 15–70 years, and less than 21 million of those of working age, i.e. between 15–54 for females and 15–59 for males. This corresponds to rates of economic activity of 62% and 71%, respectively. The census of 2001 found the rate of economic activity to be 65.5%.

As is the case in most countries of the world, ***economic activity*** amongst males exceeds that of females in Ukraine (the difference was between 7 and 8% in 2006). What is unusual is that – according to the official statistics – the economic activity of the rural population is higher than that of urban dwellers. An overwhelming majority of the economically active rural populace is composed of people who had lost their job during the course of the regime change, and after moving out from an urban area to retire to their native village or dacha, started subsistence farming. This type of suburbanisation or deurbanisation is very typical of the east Ukrainian industrial regions (Donbas and Dnipro) and the adjoining rural areas. Thus, people in possession of a household plot sufficient for pursuing subsistence activities (and selling their surplus at the local market) have become active earners. This group is rather large and included a quarter of the rural population in the 2001 census.

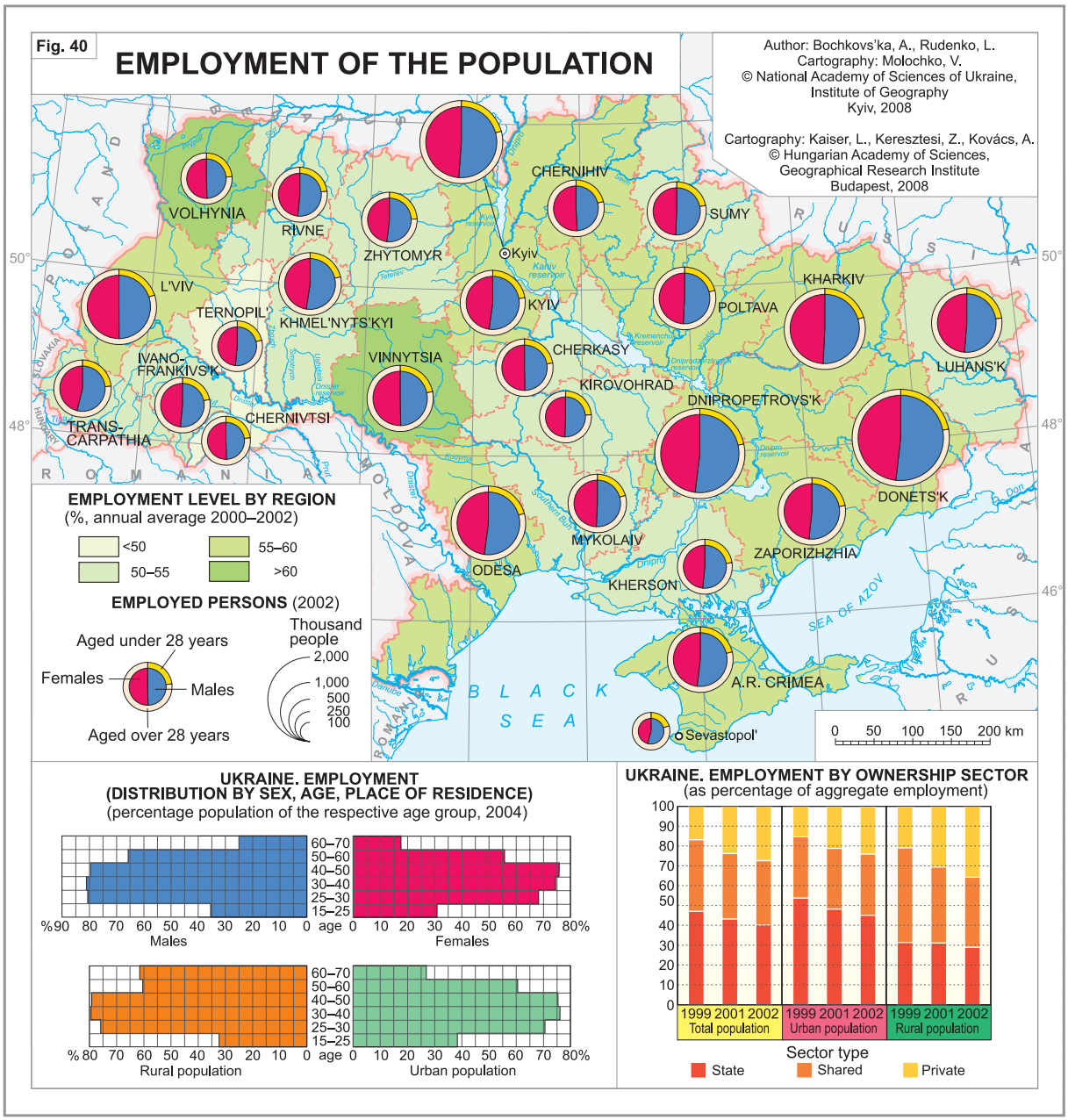
An overwhelming majority of the economically active population are employees; their

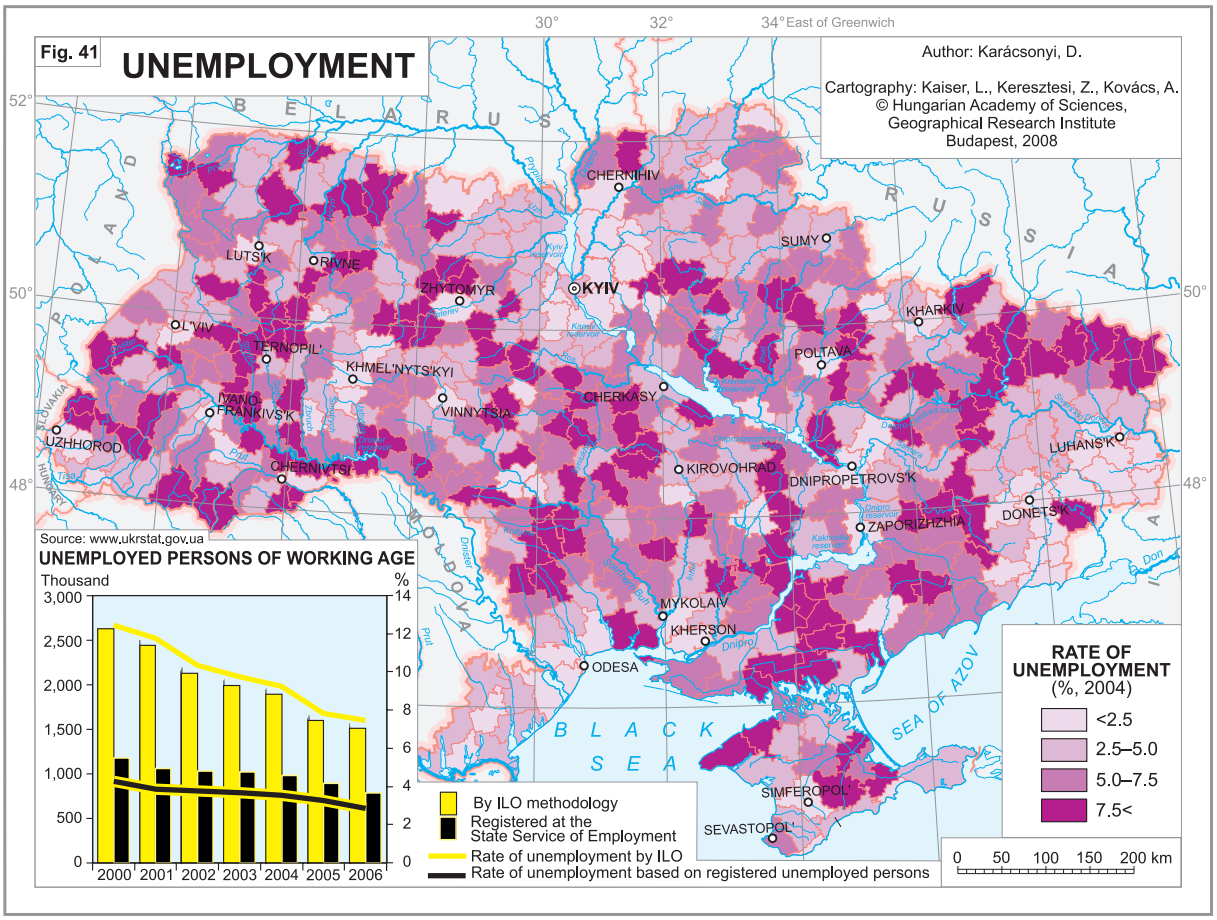
number was 20.5 million in the age bracket of 15 to 70 year olds and 18.8 million within the country's working age population as a whole. Since 2000, there has been a positive shift as the number of employees has tended to stabilise. The same trend is visible in the rates of employment, which are approaching 58% for the age group of 15–70 years and 66% for the working age population (*Figure 40*).

A dramatic contraction in the number of employees occurred in the 1990s, as is clearly indicated by a halving in the number of payroll employees between 1990 and 2003. Though to a differing spatial extent, the related data displays a decline everywhere: more in the regions traditionally associated with mining and heavy industry (Donets'k, Luhans'k and Kharkiv), and to a lesser degree in the less industrialised regions with a typically agricultural character (*Figure 41*).

Naturally, economic transformation has left its mark on the ***employment structure,*** but its impact was not as strong as in other post-Socialist countries of Central and Eastern Europe. This is signalled by a high percentage of people employed in agriculture: 22% at the time of the 2001 census. Other statistical sources put this index lower at 13–14%, but even this figure is higher than in most of the transition countries (*Figure 41*).

Despite economic transformation having taken place, manufacturing, construction and





branches of mining have retained their dominance within the employment structure: nearly 30% of employees are occupied in the secondary sector. The slow progress of the tertiary sector in Ukraine is responsible for the relatively high percentage of employees working in production, although finance, real estate and business consulting have come to the fore of late.

According to data from the Labour Force Survey, a relatively delayed but rapid growth in ***unemployment*** started in Ukraine in the mid-1990s and reached its maximum in 1998, when the number of jobless was near to 3 million. Since then it has virtually halved, dropping to around 1.5 million by 2006. Over the same period the rate of unemployment decreased from 14% to ca. 7%. The data does not reveal significant differences between urban and rural unemployment; the former was just over 7% whereas the latter stayed somewhat above 6%. A notable situation has arisen where the higher level of economic activity in rural areas is coupled with a lower rate of unemployment.

A further characteristic feature of unemployment in Ukraine is the absence of any identifiable groups that are particularly afflicted. The unemployment rate is roughly the same, amongst both males and females, and one cannot find an overrepresented age bracket.

A database established using ILO methodology is useful in revealing the volumes and structural characteristics of unemployment but fails in representing spatial disparities. However, the latter can be studied by using the available database of registered unemployed, broken down by raions. This would offer high spatial resolution, but the ambiguosity of the database calls for caution. Due to strict regulations, only some of those seeking employment are registered as unemployed. It is very probable that the rate of unemployment reflected in this database (3–4%) does not reflect the true scale, but it surely does mirror spatial disparities.

According to data for 2007, the percentage of those registered as unemployed varied within a narrow margin between the regions of Ukraine, i.e. between 0.4 and 5.4%. Although these facts would seem to preclude a deep and detailed analysis of spatial inequalities, nevertheless some region specific features may be ap-

Fig. 42

SIZE AND STRUCTURE OF EMPLOYMENT

Authors: Rudenko, L., Kozachenko, T., Panibrats'ka, O.
Cartography: Molochko, V. SSPE Kartohrafiia
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Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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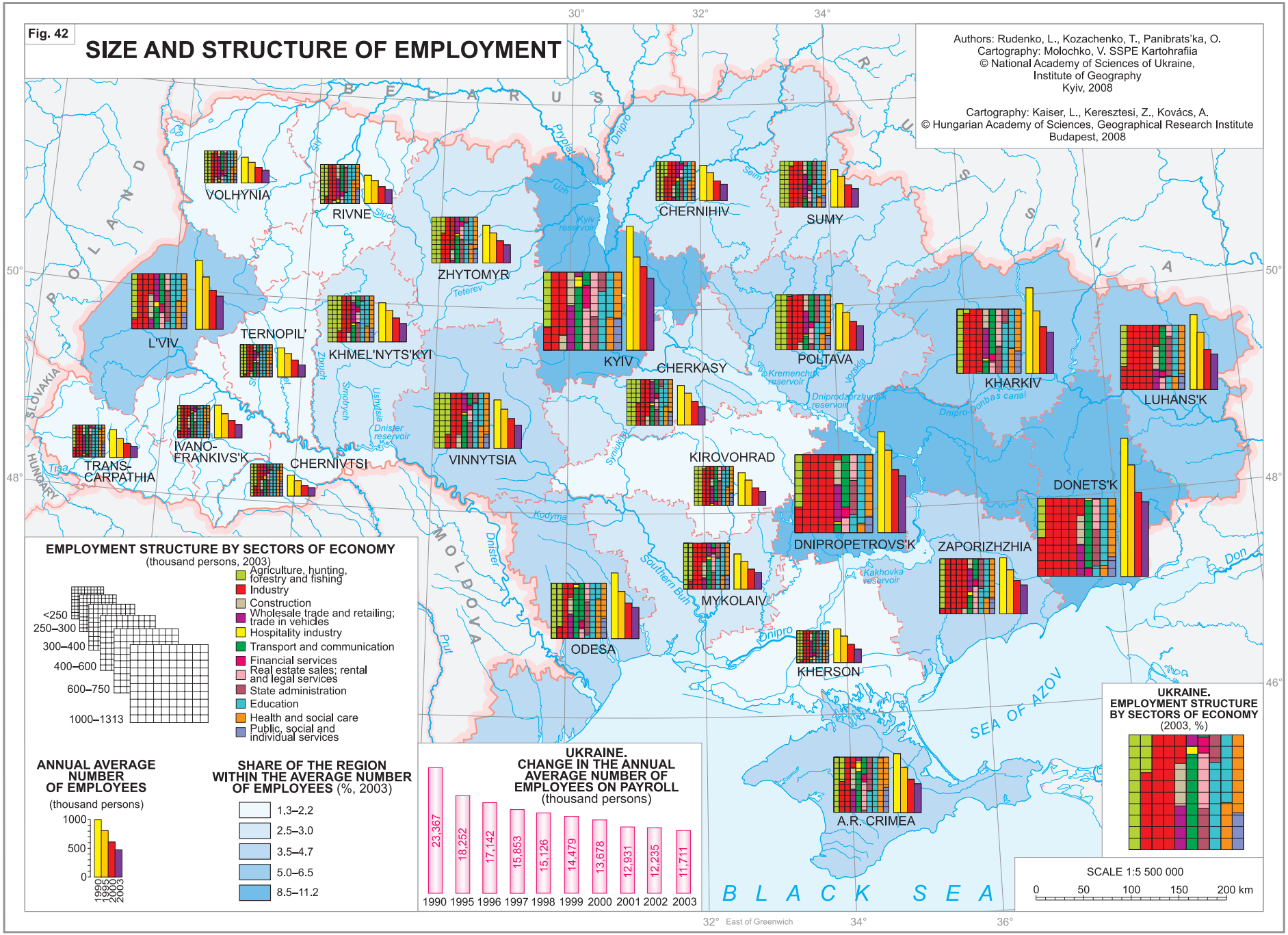


EMPLOYMENT STRUCTURE BY SECTORS OF ECONOMY

(thousand persons, 2003)

ANNUAL AVERAGE NUMBER OF EMPLOYEES

(thousand persons)

SHARE OF THE REGION WITHIN THE AVERAGE NUMBER OF EMPLOYEES (%, 2003)

UKRAINE. CHANGE IN THE ANNUAL AVERAGE NUMBER OF EMPLOYEES ON PAYROLL

(thousand persons)

UKRAINE. EMPLOYMENT STRUCTURE BY SECTORS OF ECONOMY

(2003, %)

SCALE 1:5 500 000

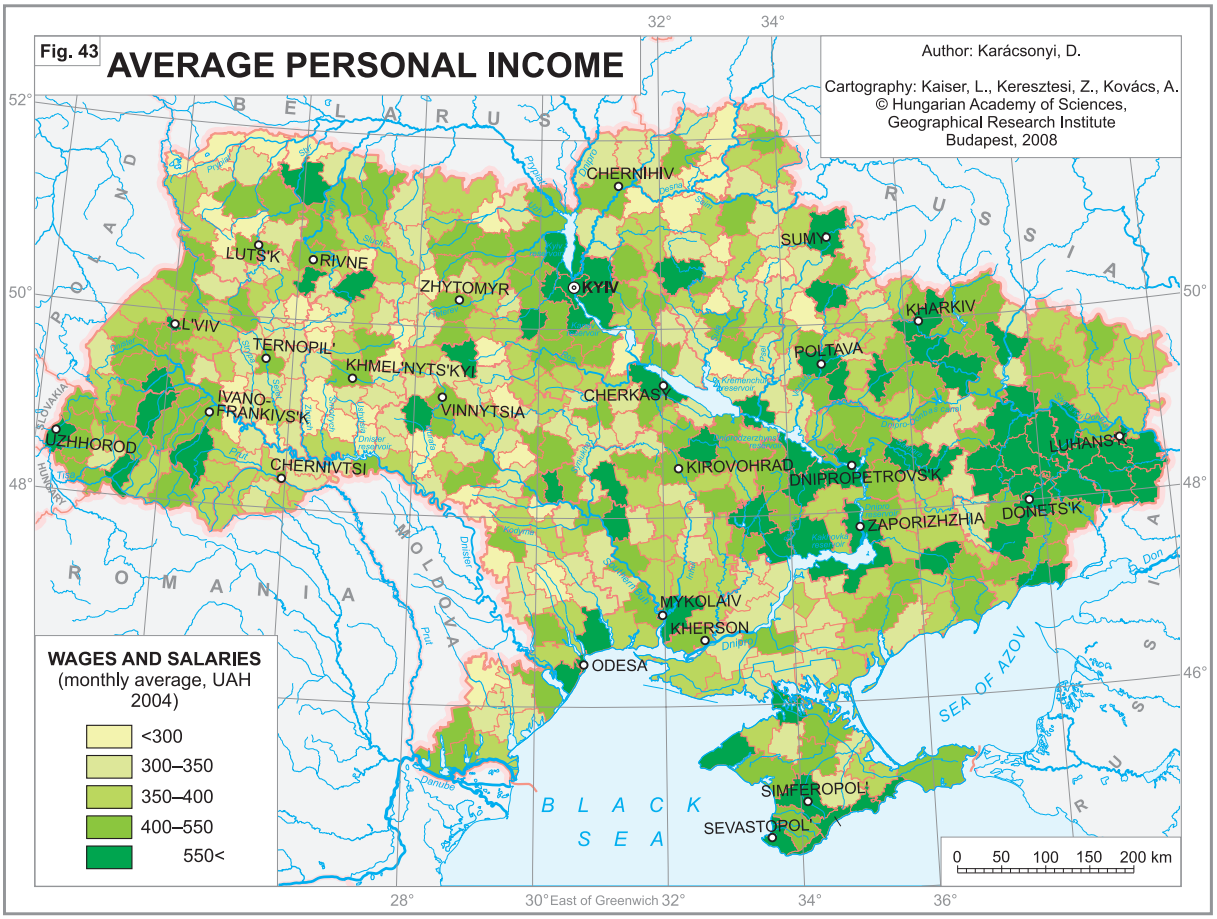
0 50 100 150 200 km

32° East of Greenwich

parent. One of them is that the lowest figures for unemployment are typical of big cities (Odesa, Kyiv, Kharkiv, Dnipropetrovs'k, Zaporizhzhia, Donets'k and L'viv) and their surroundings, thus proving their importance in providing jobs. The national capital plays a significant role: Kyiv has an extensive zone of influence, emerging as an island amidst depressed rural areas in the mid-west of the country. Due to the aforementioned phenomena of counter-urbanisation under economic pressure, in rural areas with low income levels there is also a low rate of unemployment outside urban agglomerations, but adjoining them (west of Odesa, Kyiv Region, Donets Basin, wider environs of Vinnytsia and Khmel'nyts'kyi). The western borderlands are also in a favourable situation owing to several TNCs founding subsidiaries (and hence bringing jobs) to take advantage of transport links and the geographical proximity to the periphery of the EU, along with large eastern markets. There is also relatively low unemployment in the regions popular with tourists (Carpathians, Crimea).

Larger, contiguous territories with high unemployment are to be found far from the major employment hubs, in areas within the 'labour market shadow'. Just such a semi-circle shaped area – characterised by a high rate of unemployment – is located between Donbas (*Figure 42*), the Kharkiv agglomeration and the industrial Dnipro Region. Unemployment is typically high in rural areas along the lower reaches of the Southern Buh and the Dnipro, in the forests of Polissia, Podillia and the Carpathians. Extremely high rates are recorded along the upper reaches of the Dnister (Ivano-Frankivs'k oblast: Horodenka; Chernivtsi oblast: Hertsa, Kel'mentsi), characterised by rural overpopulation and aggravated by the disadvantages of being a borderland territory (neighbouring the remotest and most backward areas of Romania and Moldova). Regions located in the labour market shadow are considered to be areas close to Transnistria in the southwest, tiny villages in Sumy oblast, along with northern, rural parts of Luhans'k oblast abutting the Russian Federation in the northeast.

Incomes of the population are fundamentally dependent on the local labour market, its opportunities for employment and rates of unemployment therefore it is not surprising that a close



relationship exists between the pattern of average income and unemployment. The maps representing the spatial correlation between these two indices are the inverse of one another (*Figure 43*).

There was a seven-fold difference between minimum and maximum average wages at a raion level in 2004, which is a particularly high figure. On the one hand only one quarter of mean incomes in the raions exceed the national average, whereas in contrast half of incomes fail to reach 75% of this average. Salaries that are higher than the average are typical of big cities and industrial centres, whereas extremely low wages are a characteristic of wide areas of rural Ukraine. However, the highest wages are not in Kyiv or in other big cities, rather they are found in the dormitory settlements near nuclear power plants such as Enerhodar, Kuznetsovs'k, Netishyn and Yuznoukrains'k, which are the "richest towns in the land". These are followed by minor seaports providing relief for Odesa: Pivdennyi (Yuzhne) and Illichivs'k. Incomes are very similar in Boryspil', near to the capital's airport. Next is Kyiv and the settlements in its sphere of influence, along with medium-sized towns reliant on coal mining in the Donbas (Pershotravens'k, Vuhledar and Rovenki). Large industrial centres (Donets'k, Kramators'k, Dnipropetrovs'k, Zaporizhzhia, Mariupol' and Nikopol') rank next, with other areas above the average following behind, i.e. the urban areas of Galicia and Transcarpathia (L'viv, Uzhhorod and Mukacheve) having successfully attracted western investment, and the hubs of tourism along the Crimean coastline (e.g. Yalta).

The meagre average wage in the peripheral areas located west of Odesa is striking (Bolhrad and its environs) – where the multi-ethnic populace engages in rough grazing on the steppe as a means of subsistence – even amidst a background of low-paid rural areas in Podillia and Polissia. With regards to the average income, similar areas are to be found in the sparsely populated steppes of Crimea and Kherson oblast, and the densely populated upper reaches of the Dnister.

Settlement System

The settlement pattern of Ukraine has evolved over a long period of time under distinct physico-geographical, political, cultural and economic conditions, and due to the expansive size of the country it shows marked regional differences. On the eve of the 2001 census, Ukraine's settlement system comprised of 454 cities and towns, 889 settlements of urban type and 28,619 rural settlements (*Figure 44*). The corresponding figures for January 1st, 2007: 458 cities and towns, 886 settlements of an urban type and 28,540 villages, the data showing a slight decrease in the number of rural settlements with the simultaneous stagnation of town development. A majority of the population (≈68%) were urban dwellers on both dates. The unexpectedly high urban ratio is the outcome of urbanisation having taken place during the Socialist era, mainly in the second half of the 20th century. Before World War I, the overwhelming majority of Ukraine's population lived in villages. The share of the urban populace was a mere 13% in 1913, which increased gradually to 34% by the eve of World War II. Due to large scale industrial development and subsequent rural–urban migration in the 1950s, the ratio of the urban population had already reached 50% by 1963. However, the real peak of urban development was during the 1960s and 1970s when the number of urban inhabitants grew by half a million people annually. The population of Kyiv doubled between 1959 and 1979, and this was the period when several cities reached the one million inhabitant threshold (Odesa, Donets'k, Kharkiv and Dnipropetrovs'k). The total number of urban inhabitants reached its historical peak with 34.8 million at the time of the 1989 census, and since then it has been decreasing. In 2001 the number of urban population was less by 2.3 million than in 1989. Despite this massive decline, the urban/rural ratio of the country did not change considerably between the last two censuses, because the simultaneous population decrease in rural settlements was even greater, due to natural loss and permanent outward migration.

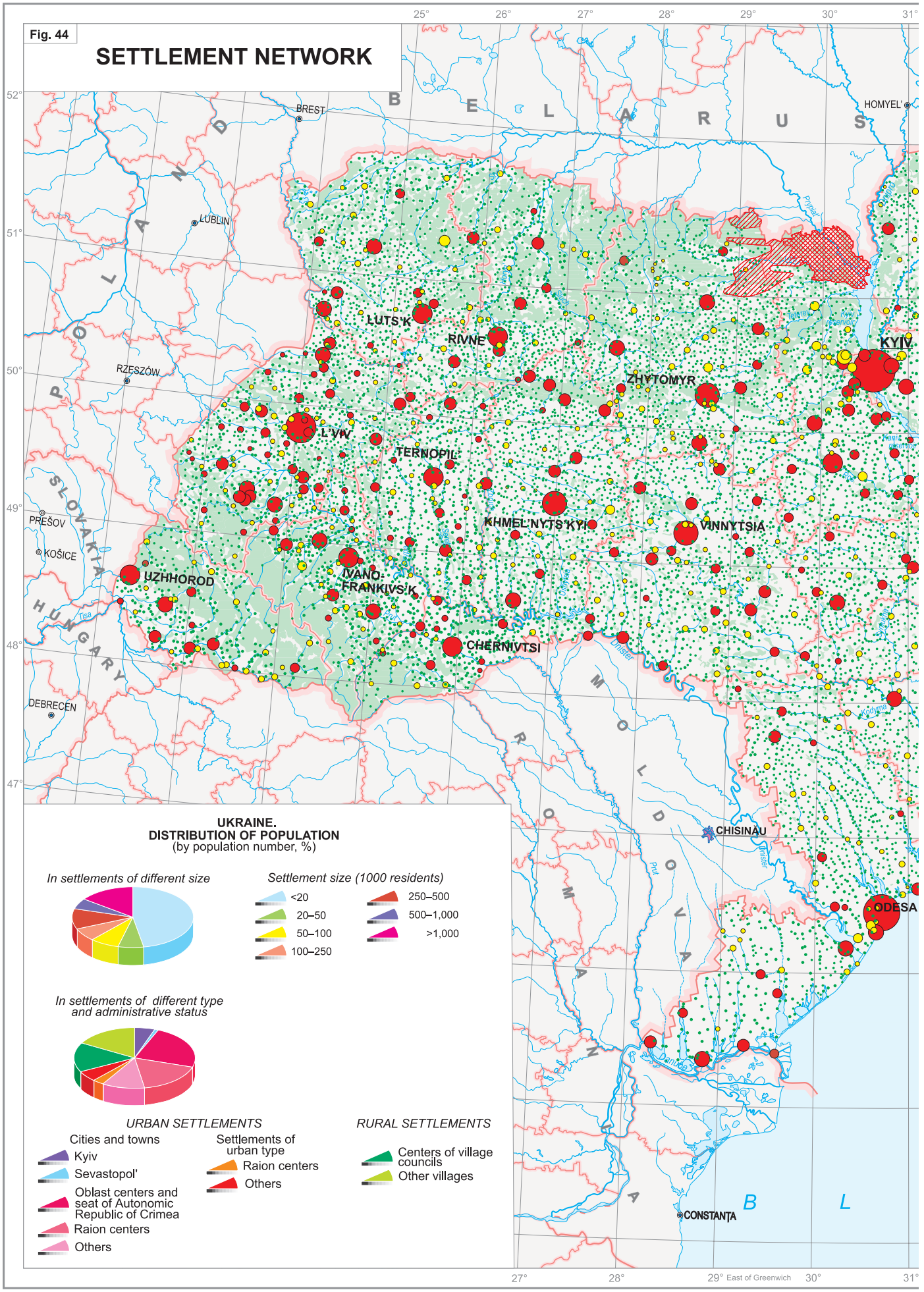
Historical development. The first city-states on the present-day territory of Ukraine were founded by the Greeks on the northern coast of the Black Sea in the 7th century B.C. These were ancient city-states: Tyras on the Dnister river, Olbia on the Buh, Chersonesus next to present-day Sevastopol', and Panticapaeum (later it became seat of the Bosporan Kingdom) where Kerch is now located. Their inhabitants were Greeks and people from local tribes: Scythians, Sarmatians and Taurians.

There are several modern towns with ancient roots: Feodosiia and Yevpatoriia (founded in the 6th century B.C.), Kerch (4th century B.C.) and Sudak (2nd century A.D.). Old centres, which emerged between the 5–9th centuries are Kiev (Kyiv), Chernihiv and Zhytomyr. In the 9–10th centuries there were 24 urban settlements in Kievan Rus'. By the 10–12th centuries, with the development of Kievan Rus' 200 urban settlements had emerged. Some of them were fortresses and seats of principalities: Bila Tserkva, Bohuslav, Vasyl'kyv, Vyshhorod, Hlukhiv, Kaniv, Korosten', Korsun', Nizhyn, Novhorod-Sivers'kyi, Ovruch, Pereiaslav, Putyvl', Lubny, Poltava, Pryluky, Radomyshl', Romny, Chornobyl', etc. At the same time some of them (Kyiv, Chernihiv, Pereiaslav, Volodymyr-Volyns'kyi, etc.) became large political and economic centres of that state.

There was intense urban construction during the period when the Principality of Galych–Volhynia was flourishing. In Galych; L'viv, Kremenets' and Sambir were established at that time and developed rapidly, whilst the same occurred in Transcarpathia (before 1919, part of north-east Hungary) with Mukacheve and Khust. The foundation of towns during the Lithuanian period (mid-14th – late 15th centuries) served the dual purposes of defence and the colonisation of Ukrainian lands. Fortified towns were built everywhere, down to the Black Sea coast, and fortresses were erected in many urban settlements of Galych, Volhynia, Podillia and Transcarpathia (north-east Hungary). In the period between the 15th and the first half of the 16th centuries, Ukraine experienced frequent assaults and attacks from Crimean Tartars and Turks, resulting in little urban construction

Fig. 44

SETTLEMENT NETWORK



UKRAINE.
DISTRIBUTION OF POPULATION
(by population number, %)

In settlements of different size

Settlement size (1000 residents)

- <20
- 20–50
- 50–100
- 100–250
- 250–500
- 500–1,000
- >1,000

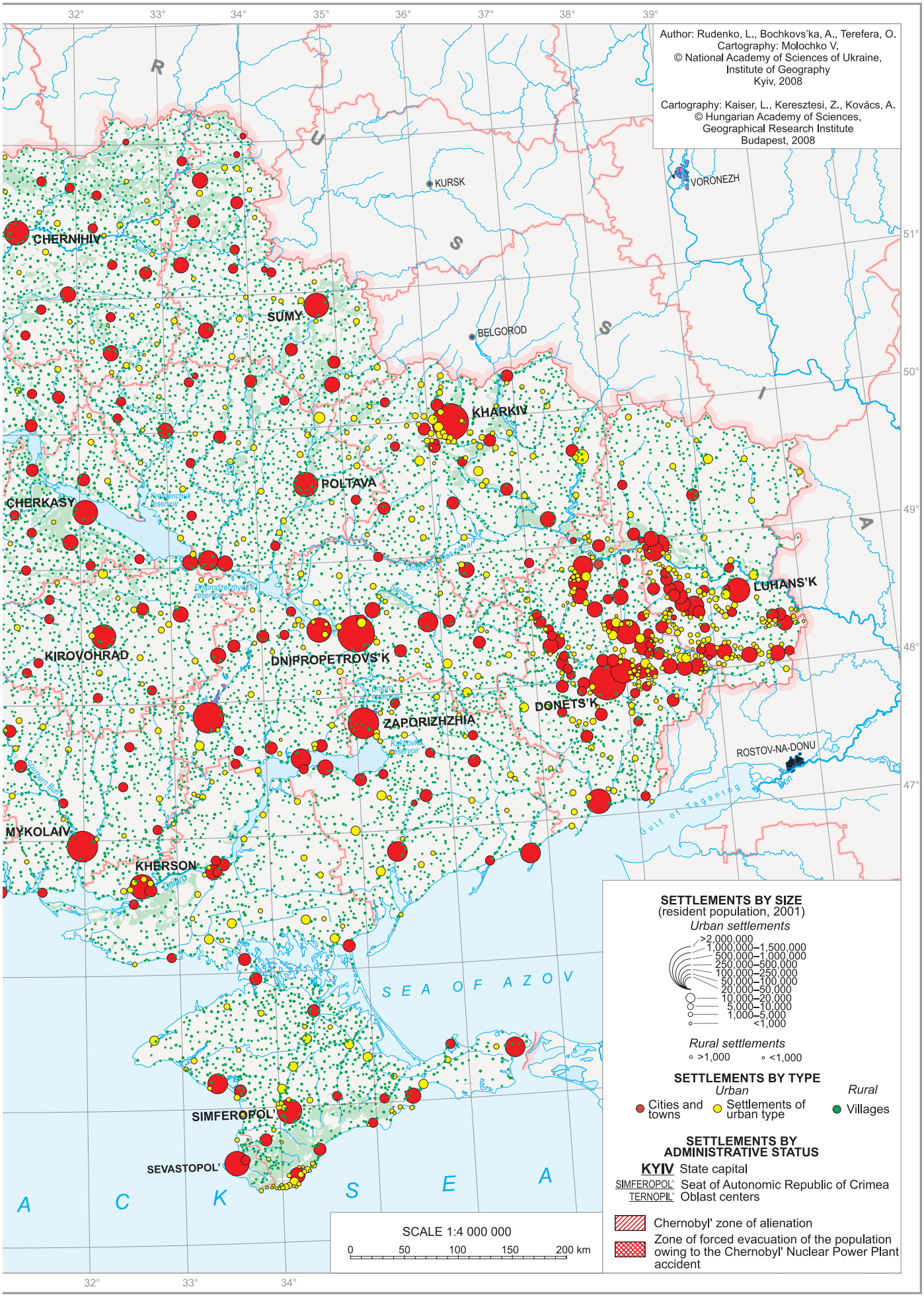
In settlements of different type and administrative status

URBAN SETTLEMENTS

Cities and towns
- Kyiv
- Sevastopol'
- Oblast centers and seat of Autonomic Republic of Crimea
- Raion centers
- Others

Settlements of urban type
- Raion centers
- Others

RURAL SETTLEMENTS
- Centers of village councils
- Other villages


Author: Rudenko, L., Bochkovs'ka, A., Terefera, O.
Cartography: Molochko V.
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RUSSIA
KURSK
VORONEZH
BELGOROD
CHERNIHIV
SUMY
KHARKIV
POLTAVA
CHERKASY
LUHANS'K
KIROVOHRAD
DNIPROPETROVS'K
DONETS'K
ZAPORIZHZHIA
ROSTOV-NA-DONU
MYKOLAIV
KHERSON
SIMFEROPOL'
SEVASTOPOL'
SEA OF AZOV
BLACK SEA
Kremenchuk reservoir
Dnipropetrovske reservoir
Kakhovka reservoir
Dnipro
Don
Gulf of Taganrog
32°
33°
34°
35°
36°
37°
38°
39°
51°
50°
49°
48°
47°
SETTLEMENTS BY SIZE
(resident population, 2001)
Urban settlements
>2,000,000
1,000,000–1,500,000
500,000–1,000,000
250,000–500,000
100,000–250,000
50,000–100,000
20,000–50,000
10,000–20,000
5,000–10,000
1,000–5,000
<1,000
Rural settlements
>1,000
<1,000
SETTLEMENTS BY TYPE
Urban
Cities and towns
Settlements of urban type
Rural
Villages
SETTLEMENTS BY ADMINISTRATIVE STATUS
KYIV State capital
SIMFEROPOL' Seat of Autonomic Republic of Crimea
TERNOPIL' Oblast centers
Chernobyl' zone of alienation
Zone of forced evacuation of the population owing to the Chernobyl' Nuclear Power Plant accident
SCALE 1:4 000 000
0 50 100 150 200 km

Fig. 45

CHANGE IN URBAN AND RURAL POPULATION

Authors: Rudenko, L., Bochkovs'ka A., Terefera, O., Liashenko, D.
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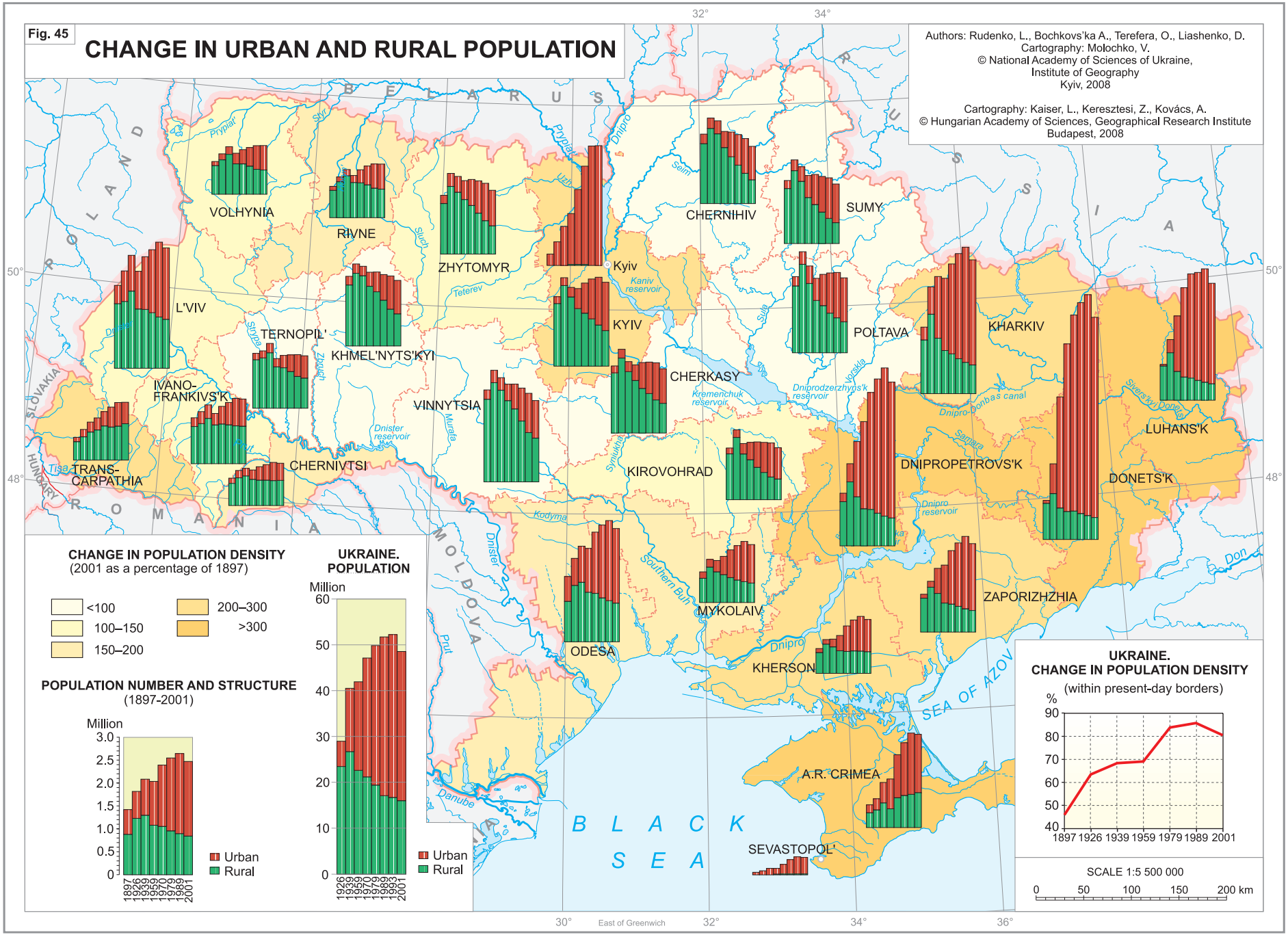

taking place. A revival came with the period of Cossack Hetmanate, when towns became the hubs of economic, cultural and religious life. By the mid-17th century there were about 1,000 urban settlements of varying size in the present-day territory of Ukraine. The majority of them, predominantly those in the western lands, had Magdeburg rights.

Starting with the mid-17th and 18th century onwards, the first towns appeared in Slobozhanschina ("Free Ukraine"), the Russian–Ukrainian borderland. Kharkiv, Okhtyrka, Sumy and Izium emerged as garrison settlements. Following the Russian annexation of the Black Sea coast and Crimea (1774–1791), at the end of the 18th century port cities were established along the Black Sea which became the main hubs of the Russian Black Sea Fleet – e.g. Mariupol' (1776), Sevastopol' (1784) and Odessa (1795). Despite the first major wave of urbanisation having taken place, the number of towns in the inner part of present-day Ukraine (i.e. the steppe zone) remained relatively low. This belt was predominantly characterised by the fortified settlements of the Cossacks, which were in fact large villages (stanica) with a regular street layout, resembling the Roman castrum. This pattern did not change until industrialisation and thus, modern urbanisation only began in the late 19th century *(Figure 45).*

A considerable amount of urban settlements (ca 150) appeared in the 18–19th centuries, emerged with the colonisation of the southern and eastern steppes or were associated with the early industrial development of these areas. In the 20th century, the imposed Soviet regime intervened in the development of the settlement system particularly strongly. Settlement development was subordinated to industrial policy and cities were considered to be the only places suitable for industrial development. A large number of new socialist (Soviet) cities were developed from the 1930s but, in particular following World War II, and they were designated for particular industrial activities. The larger ones were based on iron and steel (Dniprodzerzhyns'k, Horlivka, Makiivka and Alchevs'k) and non-ferrous metal production (Kostyantinivka), or machinery industry (Kramators'k). The smaller ones were built to act as housing estates adjacent to industrial plants, for instance next to power stations (Enerhodar, Yuzhnoukrains'k) or coal mines (Krasnyi Luch, Antratsyt) in the Donets'k Basin. As a consequence of state policy intervention, 160 settlements were awarded an urban status after World War II, most of them being the product of socialist industrialisation.

Urban system. Today over two-thirds of the population of Ukraine lives in an urban environment. However the national urban ratio (68.2%) betrays huge regional differences in urbanisation *(Figure 46).* Across the country, the level of urbanisation, the density of cities, as well as the ratio of the urban population are entirely different. The highest levels of urbanisation can be found in Donets'k (90%), Luhans'k (86%) and Dnipropetrovs'k (83%) oblasts. Three quarters of the most urbanised (80% and higher) raions are located in the south-east. Nearly all of them are dominated by large centres of heavy industry or major sea ports (such as Odesa, Kherson, Mykolaiv or Mariupol'). In the north-western part of the country, highly urbanised raions are almost exclusively found in the southern part of Polissia (including the agglomeration of Kyiv), and at the edge of the Carpathians.

From a geographical point of view, north-western Ukraine reflects the urban ratios found in south-east Europe (e.g. Romania and Serbia), whereas south-eastern Ukraine highly resembles the particularly urbanised countries of western Europe. This duality in the pattern of urbanisation is the outcome of 20th century industrialisation, and the spatial distribution of industry within the country.

According to legal definitions, urban localities include towns and settlements of urban type. In 2001 there were 454 towns in Ukraine and the urban stock varies greatly with the size and administrative function of cities. Kyiv, as the national capital and Sevastopol' as the country's most important naval base enjoy the same administrative status as an oblast. Another 174 urban centres had raion status in 2001 (by 2007 this had reached 179), predominantly the most populous ones, and there are a further 490 ordinary urban settlements.

These days the largest Ukrainian urban centres (with more than 500 thousand inhabitants) are multi-functional hubs with political, cultural and administrative functions, are economically well developed and have an extensive industrial and social infrastructure (*Table 11*). Although only 9 cities in total fall into this category, 31% of the urban population resides in these cities. The overwhelming majority

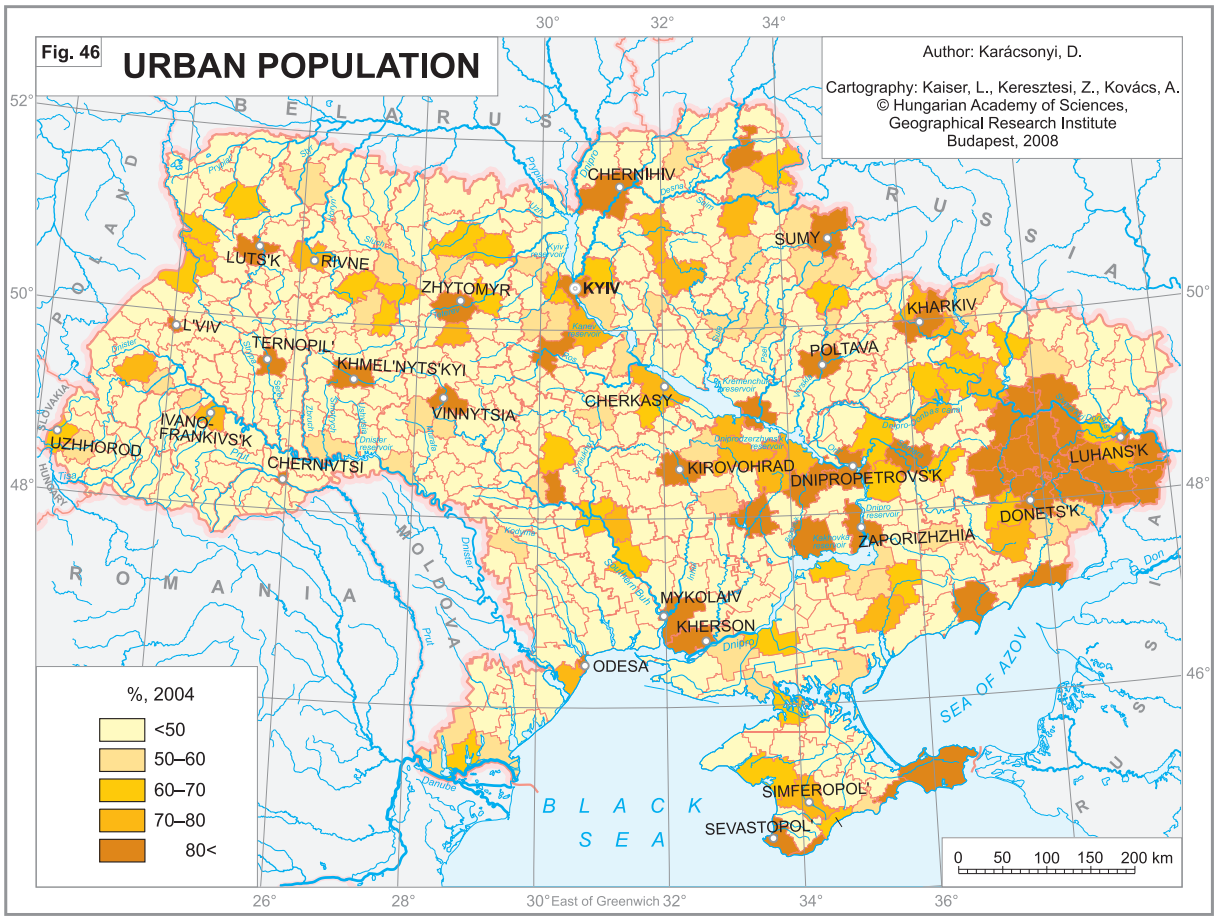

Table 11. ***Distribution of urban settlements according to size (2001)***

Urban settlements	Number of settlements	Distribution by population number (thousand persons)								
		< 3	3–5	5–10	10–20	20–50	50–100	100–500	500–1,000	1,000 <
Settlements of urban type	889	336	209	284	58	2	–	–	–	–
Towns and cities	454	5	88	667	158	113	56	37	4	–

Source: Census 2001

of large cities are located in the highly urbanised south-eastern part of the country (exceptions are Kyiv and L'viv). A typical feature from the last two decades has been a population decline in large cities, mainly owing to outward migration and a natural decrease, which began to affect the whole country after 1991 *(Table 12)*. The only exception has been the city of Kyiv, which has experienced a modest population increase, even after the 2001 census. The city recorded 2,721,000 inhabitants as of June 1st , 2007. This growth has been mainly due to new trends of internal migration within the country.

Cities with inhabitants of between 100 and 500 thousand concentrate 26% of Ukraine's urban population. Their number (37) slightly decreased between 1989 and 2001. Typically more than half of them are oblast seats, with strong administrative functions, whereas the rest are multifunctional centres, generally with industry as the main profile. Urban settlements of between 50 to 100 thousand inhabitants as a rule are administrative seats of districts, with monofunctional profiles in e.g. industry, transport or tourism. 11% of the country's urban population are residents of this type of town.

The most numerous are the cluster of small towns (up to 50 thousand inhabitants), where 19% of the urban population resides. These towns play an important role in shaping

Table 12. ***Largest urban centres of Ukraine (1959, 1989, 2001)***

Cities 1959	Thousand inhabitants	Cities 1989	Thousand inhabitants	Cities 2001	Thousand inhabitants
Kyiv	1,102	Kyiv	2,595	Kyiv	2,611
Kharkiv	953	Kharkiv	1,610	Kharkiv	1,470
Stalino (Donets'k)	701	Dnipropetrovs'k	1,178	Dnipropetrovs'k	1,065
Odesa	667	Odesa	1,115	Odesa	1,029
Dnipropetrovs'k	661	Donets'k	1,113	Donets'k	1,016
Zaporizhzhia	435	Zaporizhzhia	884	Zaporizhzhia	814
L'viv	411	L'viv	791	L'viv	733
Kryvyi Rih	386	Kryvyi Rih	726	Kryvyi Rih	669
Makiivka	358	Mariupol'	509	Mykolaiv	514
Horlivka	293	Mykolaiv	524	Mariupol'	492
Zhdanov (Mariupol')	284	Luhans'k	497	Luhans'k	463
Luhans'k	274	Makiivka	425	Makiivka	390
Mykolaiv	224	Vinnytsia	374	Vinnytsia	357
Dniprodzerzhyns'k	194	Sevastopol'	356	Simferopol'	343
Simferopol'	189	Kherson	355	Sevastopol'	342
Kherson	157	Simferopol'	344	Kherson	328
Sevastopol'	148	Horlivka	338	Poltava	318
Chernivtsi	145	Poltava	315	Chernihiv	305
Poltava	141	Chernihiv	296	Cherkasy	295
Kirovohrad	127	Zhytomyr	292	Sumy	293
Kadiivka (Stakhanov)	123	Sumy	291	Horlivka	292
Vinnytsia	121	Cherkasy	290	Zhytomyr	284
Kramators'k	115	Dniprodzerzhyns'k	282	Dniprodzerzhyns'k	256
Zhytomyr	105	Kirovohrad	270	Khmel'nyts'kyi	254
Lysychans'k	104	Chernivtsi	257	Kirovohrad	254

Source: Census data 1959, 1989, 2001
www.ukrcensus.gov.ua.

the settlement network, and accommodating the labour force of the country. Almost half of them are administrative, organisational-economic and cultural-commercial centres with a local importance. Around a quarter of them are monofunctional towns with agro-industrial or purely industrial profiles. Small and medium sized cities are characteristic elements of the settlement system of north-western Ukraine, whereas in the eastern and southern parts of the country, large cities of over 100 thousand inhabitants prevail *(Figure 47, 48, 49).* Until 1959 the overwhelming majority of large cities in Ukraine were concentrated almost exclusively in the south-eastern part of the country. Since then, the spatial distribution of these cities has become more even owing to fast population growth in some of the administrative centres in central Ukraine (e.g. Rivne, Luts'k, Khmel'nyts'kyi and Ternopil'). Despite this trend, the regional pattern of large urban centres has remained fairly stable over time.

The present-day classification of cities has a specific group called, 'settlements of urban type'. As is similar the case in other post-Soviet countries, they represent a transitory form of settlement in-between a village and a small town. In 2001 there were 889 settlements of an urban type in Ukraine, accommodating 13% of the total urban population. Their number has been continuously decreasing since 1989 when the same figure was 926. Most of them (ca. 30%) are concentrated in Donets'k and Luhans'k oblasts. The majority of the active workforce living in settlements in the vicinity of large urban centres commute into these big settlements on a daily basis.

Settlements of differing type and population size, together with large cities form specific groups, called urban agglomerations, of which

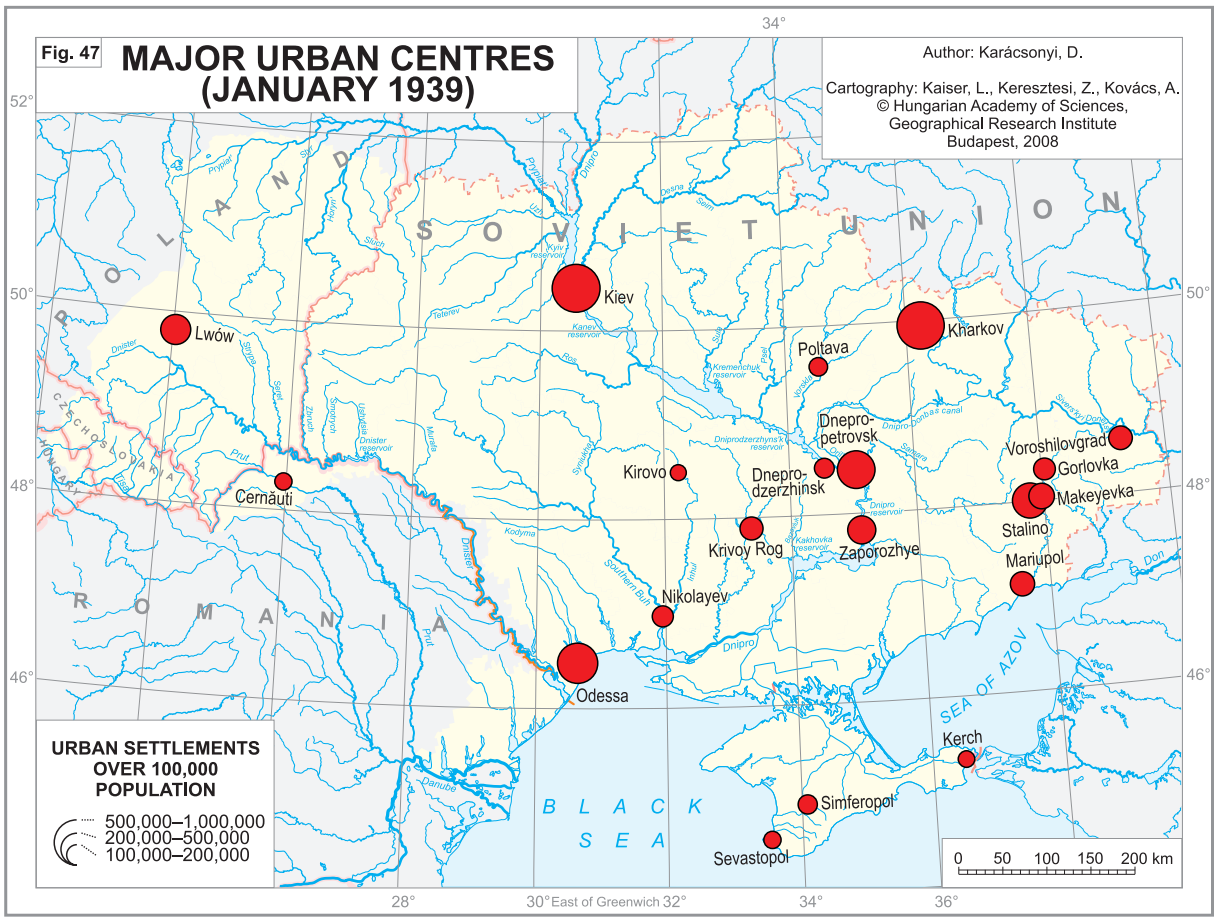
Fig. 47
MAJOR URBAN CENTRES (JANUARY 1939)
Author: Karácsonyi, D.
Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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URBAN SETTLEMENTS OVER 100,000 POPULATION
500,000–1,000,000
200,000–500,000
100,000–200,000
Kiev
Lwów
Kharkov
Poltava
Dnepro-petrovsk
Dnepro-dzerzhinsk
Kirovo
Voroshilovgrad
Gorlovka
Makeyevka
Stalino
Mariupol
Cernăuti
Krivoy Rog
Zaporozhye
Nikolayev
Odessa
Kerch
Simferopol
Sevastopol
SEA OF AZOV
BLACK SEA
0 50 100 150 200 km
34°
52°
50°
48°
46°
28°
30° East of Greenwich 32°
34°
36°

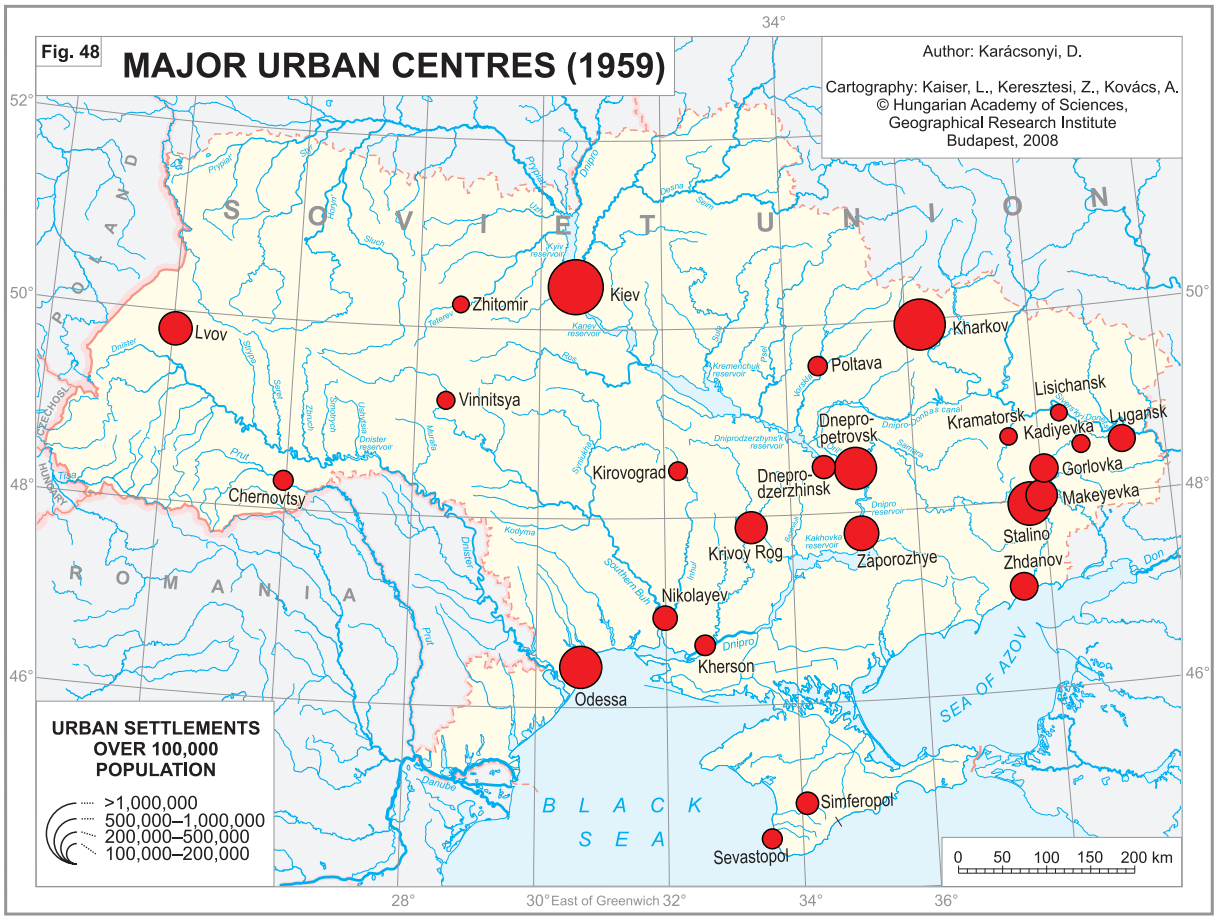
Fig. 48
MAJOR URBAN CENTRES (1959)
Author: Karácsonyi, D.
Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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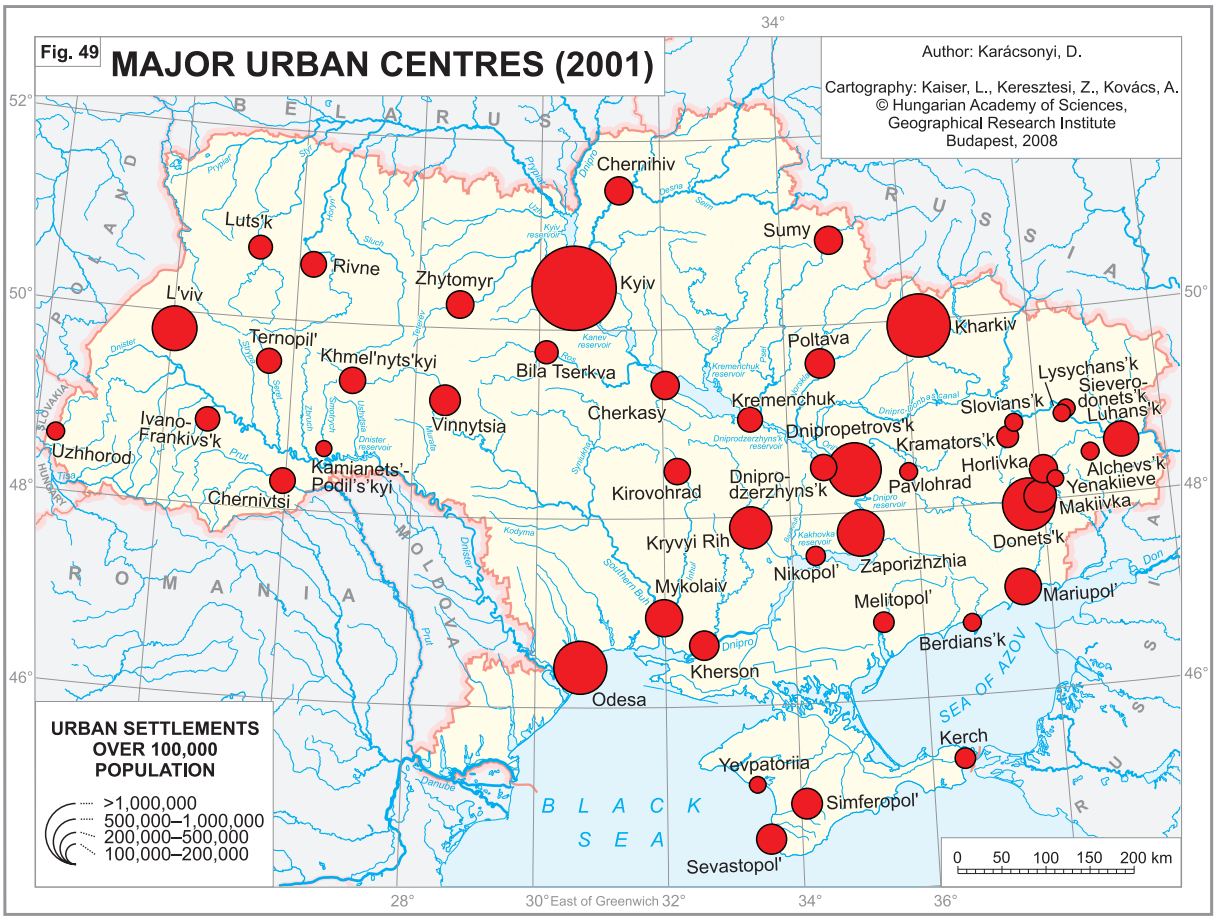
URBAN SETTLEMENTS OVER 100,000 POPULATION
>1,000,000
500,000–1,000,000
200,000–500,000
100,000–200,000
Kiev
Zhitomir
Lvov
Kharkov
Poltava
Vinnitsya
Lisichansk
Kramatorsk
Kadiyevka
Lugansk
Dnepro-petrovsk
Dnepro-dzerzhinsk
Kirovograd
Gorlovka
Makeyevka
Stalino
Zhdanov
Chernovtsy
Krivoy Rog
Zaporozhye
Nikolayev
Kherson
Odessa
Simferopol
Sevastopol
SEA OF AZOV
BLACK SEA
0 50 100 150 200 km
34°
52°
50°
48°
46°
28°
30° East of Greenwich 32°
34°
36°



40% of the population are inhabitants. The most populous are those that have developed around Kyiv, Donets'k, Kharkiv, Dnipropetrovs'k and Odesa, which have a particularly high density of different settlements and total population.

Rural settlements. Ukraine's present-day rural settlement network started to take shape in the 18–19th centuries. Until then, the population was scattered between fortified feudal estates, Cossack slobodas (landed holdings) and farmsteads. The network of scattered farmsteads and small villages gradually vanished from Ukraine as a consequence of multiple factors. First came the liquidation of the kulaks as a social class in the 1930s (relatively wealthy peasants using employed labour) and the subsequent famine, later the elimination of villages claimed to have become non-viable in the 1960–70s, parallel with extensive urbanisation.

According to the census of 2001, Ukrainian rural settlements included 28,619 villages of varying population size and functional type (*Table 13*). At that time 167 of them were uninhabited. By 2007 the number of villages had slightly decreased to 28,540, mostly due to uninhabited settlements being removed from the statistics. Classification by population number divides the villages of Ukraine into: small villages (up to 500 inhabitants), medium sized (500 to 1,000) and large (over 1,000 persons) ones. The average size of villages was 558 inhabitants in 2001. From 1989 the total population of large villages decreased, whereas that of the smallest settlements (below 100 inhabitants) increased. According to the first population census conducted in Ukraine as an independent state (in 2001) the most numerous group of villages were the so-called tiny villages; ca 20% of Ukrainian villages had less than 100 inhabitants at that time. Even there are around 3,600 villages in the country with less than 50 inhabitants. Altogether, 80 thousand people live in such tiny villages.

Regional disparities within the rural settlement network stem from history, natural factors and socio-economic conditions. In Polissia, with its mosaic pattern of farm holdings, and also in north-eastern and eastern urbanised areas, small sized villages prevail. In the forest steppe zone, with its high population density, villages tend to be of a medium size and the

Table 13. ***Distribution of rural settlements according to size (2001)***

Total number of rural settlements	Distribution by population number										
	Uninhabited	< 26	26–50	51–100	101–200	201–500	501–1,000	1,001–2,000	2,001–3,000	3,001–5,000	5,000 <
28,619	167	1,867	1,693	2,795	4,185	7,421	6,034	3,194	759	410	94

Source: Census 2001

pattern also becomes denser, whilst in the steppe the network conversely becomes thinner. The largest villages can be found in the Ciscarpathian and Transcarpathian regions where many are located in the mountain environment. There are 228 rural settlements in L'viv oblast, 272 in Ivano-Frankivs'k oblast and 79 in Chernivtsi oblast. The average density of the rural settlement pattern in Ukraine comes to ca 50 settlements per 10 thousand square km. A maximum density is reached in Podillia, whilst the minimum is recorded in the southern and eastern, more urbanised regions of the country.

The functional type of rural settlements is less variable than that of urban settlements. Most of the villages retain a traditional agricultural profile, whilst some of them possess organisational and administrative functions (village councils, or "rada" are to be found in 10,279 rural settlements). Larger villages often accommodate farming centres belonging to large-scale agricultural businesses which are predominantly of local importance. Most villages have been badly affected by significant ageing of the population and outward migration. Different forms of suburbanisation (of population, services, etc.), specific urban–rural migration and a subsequent rejuvenation of villages (in particular around larger cities) are virtually unknown in Ukraine.

ECONOMY

General Characteristics of the Economy

Ukraine is a country rich in natural resources and mineral raw materials (iron and manganese ores, coal, natural gas, uranium ore, etc.) as well as being an exporter of electricity. The volume of steel production ranks seventh in the world, whilst iron smelting and machine building are important economic branches, also global in scale. Having inherited electronic industries, along with military and space technology from the former Soviet Union, its economy also possesses solid foundations in high-tech industries. Ukraine has always been amongst the main producers of agricultural output and remains today a breadbasket for the countries of the former USSR, supplying cereals, sugar, meat and dairy products. Based on the above factors, in combination with its highly trained workforce, the country should have gradually become a leading economy in Europe, but due to political, social and economic changes over the past two decades it has failed to meet expectations.

As a sovereign and independent nation, Ukraine has experienced 17 years of painful and controversial change in the sphere of its economy. Over this period, some of the key steps in the transformation process have been undertaken: the basic essentials of a free-market economy, i.e. financial, taxation and banking systems were established, tariff and customs regulations set up. Together they form the infrastructure of the Ukrainian national economy. Markets in real estate, commodities and financial services have emerged. A two-tier banking system, a currencies market and a securities exchange were established. A national system of payments for financial transactions was formed, utilising new and sophisticated technologies, based on a system of electronic transfers that enable banks to adopt global standards in information management for settlements between each other.

In the first phase of transition, macro-economic stabilisation and financial reform were the priorities and over four years (1992–95) a transitory domestic currency (*kupon*) was in use. Financial reform (with the introduction of a new currency: *hryvnia,* UAH) could only be carried out in September 1996, after the rate of inflation was brought down, price subsidies cut, and the budget deficit stabilised. Later on, the transformation was focused on institutional reforms, chiefly with regards to restructuring the economy.

In the course of economic reform, positive results have been achieved with the policy of macro-economic stabilisation, the Gross National Product (GNP) has been growing, the inflation rate was curbed considerably, and the exchange rate of the domestic currency is now moving towards stability (*Table 14*). A recent growth in production – generated by the reforms and mainly arising from the export of heavy-industrial goods – has only partly succeeded in compensating for the structural problems inherent in the national economy. About one third of industrial output is represented by coal mining, and iron and steel smelting, the latter contributing nearly half of Ukrainian exports. Though the country is an important exporter of electricity, it nevertheless relies on imports of oil and gas from Russia and Turkmenistan. Oil refinery capacity is in the possession of, and operated by Russian firms. A heavy dependency on Russian oil and gas has had a strong impact upon the economy and Ukraine's foreign policy.

A fundamental task during the period of transition has been **privatisation**, with the emergence of a mixed and diverse economy as its ultimate target. There has been a breakthrough in the reform of ownership structures with expanding corporate and private sectors. All available privatisation techniques were deployed: share issues, asset sales, tenders, buy-outs, etc. The assumption was made that private ownership structures and the resulting new organisational/legal framework would – with the absence of price controls and the presence of competition – replace the role of state control over the economy. Only supervision of the tax policy, budgetary spending and customs

Table 14. ***Dynamics of macroeconomic indicators (1995–2006; in %)***

Indicators	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Real growth rate of GDP	-12.2	-10.0	-3.0	-1.9	-0.2	5.9	9.2	5.2	9.6	12.1	2.6	7.0
Change in industrial output	-12.0	-5.1	-0.3	-1.0	4.0	12.4	14.2	7.0	15.8	12.5	3.1	6.2
Change in agricultural output	-4.0	-9.5	-1.9	-9.8	-6.9	9.8	10.2	1.2	-11.0	19.7	-0.1	0.4
Growth rate of capital investment	-28.0	-22.0	-8.8	6.1	0.4	14.4	20.8	8.8	31.3	28.0	1.9	19.0
Retail trade turnover	-14.0	-5.1	0.2	-6.6	-7.1	8.1	13.7	15.0	20.5	21.9	23.4	26.4
Real income of population						4.1	10.0	18.0	9.1	16.5		
Income of population		52.1	24.2	8.6	13.8	40.5	25.9	17.1	16.5	27.2	39.1	25.7
Export of goods and services (trade balance)		19.1	0.0	-13.4	-7.9	17.9	9.5	10.7	24.0	42.6	7.5	13.2
Import of goods and services (trade balance)		17.4	2.0	-14.0	-19.1	18.9	14.1	5.0	28.7	31.3	20.4	22.0
Annual balance of current account (% of GDP)		-2.7	-2.7	-3.0	5.4	4.6	3.7	7.5	5.8	10.6	2.9	-1.5
Foreign indebtedness (% of GDP)						45.2	36.6	33.6	29.7	47.2	46.8	46.2
Inflation rate, December to December						25.8	6.1	-0.6	8.2	12.3		
USD exchange in Hryvnia*			1.86	2.50	4.26	5.51	5.38	5.49	5.51	5.47	5.17	5.22
Unemployment rate	5.6					11.7	11.1	10.1	9.1	8.6	7.2	6.8

Remark: * yearly average (www.oanda.com/convert/fxhistory)
Source: www.bank.gov.ua; www.cisstat.com; www.ier.kiev.ua; www.ukrsat.gov.ua

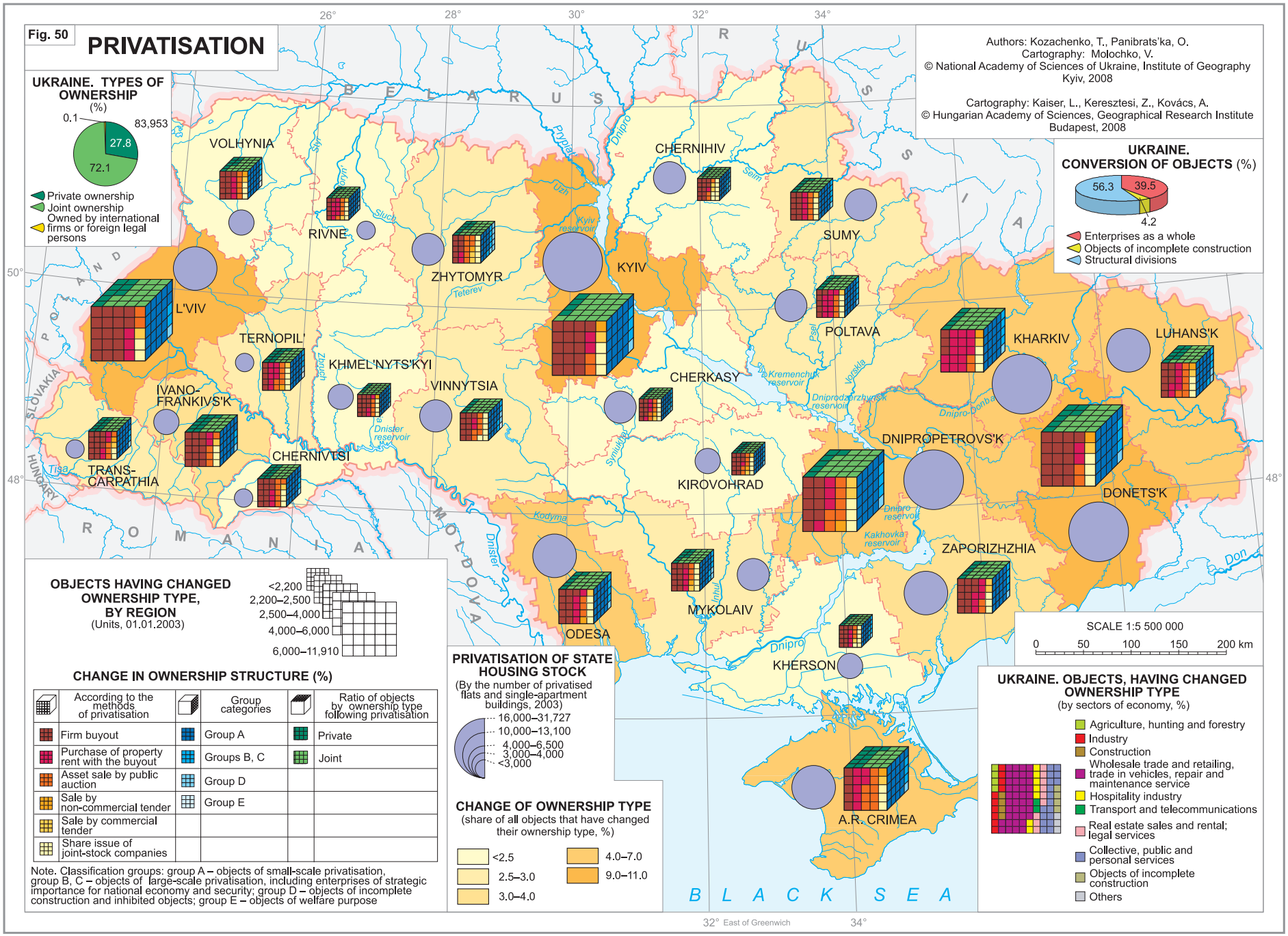
and tariff regulations have been retained at the state level. State control ceased to play a role in manufacturing and financial spheres, and newly privatised firms now operate solely with the interests of proprietors as their primary concern. It should, however, be added that in many cases the new owners are by no means interested in economic restructuring. Recent changes at an institutional level have led to tangible disparities in the benefits created by the new economic climate: parallel to the growing fortunes of the oligarchy, a great majority of the population is suffering from decreasing material wealth.

During the privatisation process, the number of entities in the Unified State Register of Enterprises and Organisations of Ukraine (the business register) increased by 66.2% – from 615,686 in 1997 to 1,023,396 in 2005. From the beginning of the privatisation process in 1992, until January 1st, 2005, 96,549 entities (of which 26% were public and 74% municipal) changed ownership, and the share of private ownership in the overall picture reached 88.2%. This process was most intensive in the oblasts of the largest urban and industrial centres (Kyiv, Donets'k, L'viv, Dnipropetrovs'k, Kharkiv) (*Figure 50*). Similar spatial patterns can be observed in the case of the privatisation of state housing stock. In 2004, 222,299 apartments and one-apartment building were privatised, 81.5% of them free of charge or with compensation attached.

Ukraine is presently attempting to steer a course of development that will lead to a model of a socially orientated market economy, with equal opportunities for its citizens, and tangible rule of law. Regrettably, over the period of time since independence was achieved, attempts to reach this aim have not led to the results hoped for, particularly in the social sphere. Ongoing social transformation has failed to strike a balance between economic, societal and political factors. Nevertheless, since the year 2000 Ukraine's economy has experienced a remarkable take-off. The rate of increase in the **Gross Domestic Product** (GDP) has been higher than that of its neighbouring states to both the west and east. This promising recovery in the Ukrainian economy is due to an inexpensive labour force, and a growing demand in both domestic and international markets for the commodities extracted and produced in Ukraine. In particular, the high GDP growth rate in 2004 (12.1%) was due, in part to

Fig. 50

PRIVATISATION



strengthening international (e.g. Russian and Chinese) demand for ferrous metals and rising prices for raw materials. This is an export oriented model based predominantly on mineral-extracting industries, metalworking, oil processing and the manufacture of chemicals. Ukraine has proven to be competitive on the world market with commodities of low added value (chemicals, metals, electricity, grain, etc). At the same time, the national economy is heavily dependent on high-technology imports from Europe and imports of energy – crude oil and natural gas. Future economic development of the country, towards a socially oriented market economy, is likely to be based on a long-term strategy of economic growth paired with a simultaneous rise in the living standards of the population.

Within Ukraine, a marked spatial differentiation has been shaped by the relationship between the core and peripheral. 40% of GDP (and 48.5% of gross value added) is produced by five regions (Kyiv and the oblasts of Donets'k, Dnipropetrovs'k, Zaporizhzhia and Odesa), which also share 59% of Foreign Direct Investment, produce 67% of total exports and consume 65% of imports (2004). They also have the highest figures relating to dynamics in the sphere of innovation and infrastructure networks (*Figure 73*). There is a tenfold difference in magnitude between the leading region and those that are lagging behind, and similar disparities are also common at the lower administrative level of division.

Examining the figures for **gross value added** (at current prices), the poorest regions are to be found in western Ukraine (e.g. Bukovina, Podillia, Volhynia and Transcarpathia) with 2.5–4.5 billion UAH (2003), lagging far behind Kyiv City's figure of 44 billion UAH and that of Donets'k oblast at 30 billion UAH. This economic disequilibrium (of a "poor West" contrasted with a "rich East" and Kyiv) is also reflected in the spatial patterns of gross value added per capita: western oblasts 2,700–3,500 UAH; Kyiv 17,000; eastern oblasts 5,400–6,400 UAH per capita (2003) (*Figure 51*).

Finance and credit. The first financial institutions had already appeared in Ukraine in the 18th century, but a genuine development of the system only started in the 1990s with the emergence of the independent Ukrainian state and its fledgling market economy. An important part of this system is the sphere of credit and banking. At the end of 2004 there were 182 banks in the country and of them 162 were in fact operating. A positive trend visible as a result of their operations is an increasing volume of capital and banking transactions. In the same year, commercial banks were operating in 20 cities. More than half the banks, capital and transactions are centered on Kyiv. Additionally there is a high spatial concentration of banks in Kharkiv, Dnipropetrovsk, Odesa, Donets'k, Zaporizhzhia and L'viv. The emergence and growth in the regional network of commercial banks is a twofold process. Firstly there is an emergence of branches and regional sections, as territorial units of large, so called 'system banks' , which have been organised along the lines of state banks. Second is the territorial expansion of the pre-existing network of large commercial banks. The focus of regional networks is on Kyiv, concentrating four fifth of all banking offices, but a substantial role in shaping regional networks belongs to Dnipropetrovs'k, L'viv and Kharkiv.

The infrastructure of the Ukrainian stock market is comprised of buyers and sellers of securities, those organising these transactions, depository institutions, mutual investment companies, etc. In 2003, 857 traders were active, chiefly on the secondary market for stocks and shares. 15.5% of them were commercial banks, 13.2% were investment companies, and 71.3% were stockbrokers. 46.4% of entities trading in securities (both legal and natural persons) are to be found in Kyiv oblast, 9.1% in Kharkiv oblast, 9.2% in Dnipropetrovs'k oblast and 7.8% in Donets'k oblast.

An important part of the investment market is the National Depository System. In early 2004 there were 364 registrars and 122 holders of securities. A majority of them (over 60%) operated in Kyiv, Kharkiv, Donets'k and Dnipropetrovs'k oblasts. A significant role in providing capital markets functions belong to investment companies, e.g. mutual funds. Most of them have been engaged in handling the issue and distribution of privatisation bonds. 137 investment funds were operational in Ukraine in 2003, along with 113 investment companies. They were concentrated in four industrially developed regions: Kyiv (including the City of Kyiv), Kharkiv, L'viv and Zaporizhzhia oblasts.

Investments. The transition of Ukraine towards a market economy has been accompanied by profound changes in the intensity and

Fig. 51

GROSS VALUE ADDED

Authors: Kozachenko, T., Panibrats'ka, O.
Cartography: Krizhova, N.
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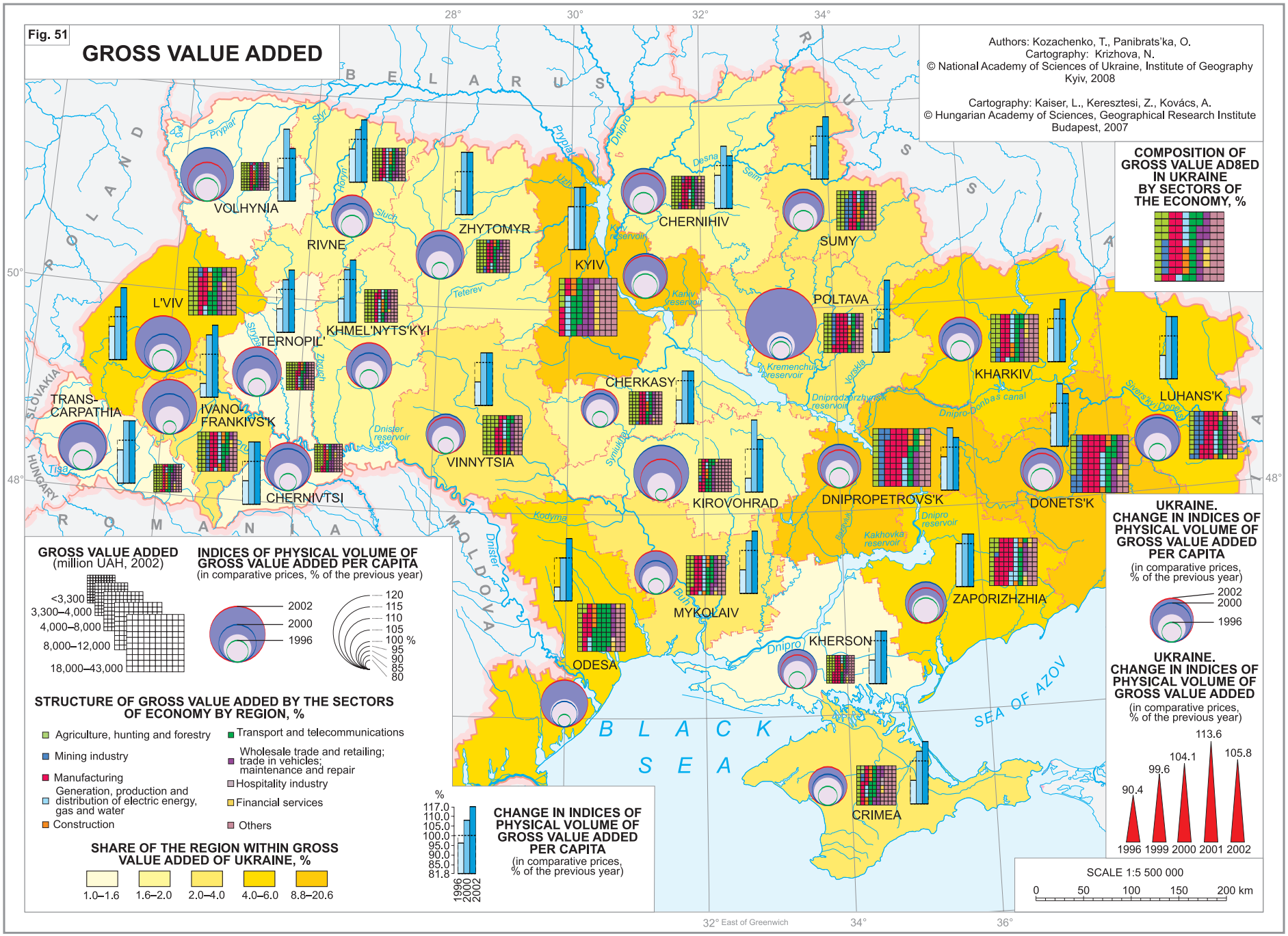


COMPOSITION OF GROSS VALUE AD8ED IN UKRAINE BY SECTORS OF THE ECONOMY, %

GROSS VALUE ADDED
(million UAH, 2002)

INDICES OF PHYSICAL VOLUME OF GROSS VALUE ADDED PER CAPITA
(in comparative prices, % of the previous year)

STRUCTURE OF GROSS VALUE ADDED BY THE SECTORS OF ECONOMY BY REGION, %

- Agriculture, hunting and forestry
- Mining industry
- Manufacturing
- Generation, production and distribution of electric energy, gas and water
- Construction
- Transport and telecommunications
- Wholesale trade and retailing; trade in vehicles; maintenance and repair
- Hospitality industry
- Financial services
- Others

SHARE OF THE REGION WITHIN GROSS VALUE ADDED OF UKRAINE, %

1.0–1.6 | 1.6–2.0 | 2.0–4.0 | 4.0–6.0 | 8.8–20.6

CHANGE IN INDICES OF PHYSICAL VOLUME OF GROSS VALUE ADDED PER CAPITA
(in comparative prices, % of the previous year)

UKRAINE. CHANGE IN INDICES OF PHYSICAL VOLUME OF GROSS VALUE ADDED PER CAPITA
(in comparative prices, % of the previous year)

UKRAINE. CHANGE IN INDICES OF PHYSICAL VOLUME OF GROSS VALUE ADDED
(in comparative prices, % of the previous year)

SCALE 1:5 500 000

0 50 100 150 200 km

32° East of Greenwich

structure of investment activities. Owing to its close interrelationship with the general financial and economic state of the country, a setback in the economy was reflected by changed activity in the investment sphere. The years 1991–1997 experienced a continual reduction in the volume of investment, but a turning point was reached in 1998. Since then capital investment has been on the increase and reached 125.3 billion UAH by 2006 (by comparison this volume was only 12.4 billion UAH in 1997).

Transformation processes were also visible in the sectoral distribution of investments during the period from 1998 to 2005. Despite a sharp reduction in investment in the farming sector (a drop from 21.3% to 3.5%), there has been a relative increase in the ratio of industrial (from 34.5% to 40.7%), and the transport and communications sectors (from 9.7% to 19.7%) within the total quantity amount of investment. The largest amounts of industrial investment occurred in the regions where this sector is particularly developed, such as Donets'k (63.1%), Zaporizhzhia (68.6%) and Luhans'k (64.2%) oblasts, whereas there is a reduced flow of industrial capital investment into Transcarpathian (26.8%) and Ternopil' (23.1%) oblasts (the latter two showing a dominance of the farming sector) and Crimea (27.0%). With regards to investment in the social and cultural spheres, no significant spatial disparities can be observed.

The shrinking volume of investment into the construction industry sector is contrasted by a growth in the relative weight of equipment assembly and major repairs which has given rise to a specific technological structure of investment. Over recent years the ratio of construction and manufacturing activities came to the fore and reached 40% of capital investment.

Significant shifts are evident in the structure of investment when broken down into sources of financing. The share of central (governmental) capital investment had dropped from 27% in 1990 to 5% by 2003. There is negligible fluctuation in this value across the regions of the country. The specific weight of capital investment by individual companies has been on the increase, reaching 70.1% during the same period.

A marked characteristic feature of investment activities in Ukraine has been their increasing spatial differentiation. One of the striking processes is the redistribution of capital between industrial regions (Donbas, industrial Dnipro Region or Pridniprovye, etc.), predominantly agricultural regions (Podillia, Central Ukraine and Ciscarpathia), and industrial-farming regions (territories adjoining the Black Sea and Sea of Azov). The share of the first group within invested capital had grown from 46.8% in 1990 to 59.2% by 2003, whilst the ratio of the third group (Crimea and Odesa, Mykolaiv and Kherson oblasts) dropped from 16.7% to 14.8% over the same period.

The amount and share of **Foreign Direct Investment** (FDI) reveals a trend of gradual growth, increasing from 483.5 million USD (1995) to 21.2 billion USD (January 1st, 2007). The increase in FDI skyrocketed following the "Orange Revolution", the elections in 2004 and the subsequent measures aimed at making the Ukrainian business environment more attractive (e.g. simplifying taxation, reducing the complexity of the regulatory framework, and fighting corruption). The most striking sign that reforms were succeeding in encouraging foreign investors (resulting in the sudden doubling of FDI) was the privatisation of the largest Ukrainian steelworks "Krivorizhstal" (for 4.8 billion USD) by the German Mittal steel group, and the purchase of Aval Bank (1 billion USD) by the Austrian Raiffeisen Bank at the end of 2005. By 2007, the member states of the EU had invested 16 billion USD into the Ukrainian economy. Besides the steel industry, finance and the real-estate/wholesale trade were the largest magnets for EU investors, attracting 1.2 billion and 1.1 billion USD respectively. Following Germany, the largest investor is Cyprus, another EU member, but investment from which is mainly made up of Ukrainian–Russian capital (similar to FDI from the British Virgin Islands) (*Table 15*). Parallel to the decrease in the share of the previous FDI leader, the USA, the ratio of many other EU member states is increasing (e.g. Netherlands, France, Poland and Hungary). The largest amounts of FDI arrived in Kyiv and in the oblasts of the most important regional, industrial centres (e.g. Dnipropetrovs'k, Donets'k, Zaporizhzhia, Odesa and L'viv) (*Figure 52*). Besides investment in heavy industry, FDI in the wholesale trade (e.g. Kyiv, Odesa and Donets'k) and in tourism (Crimea) is also important. The relatively high per capita FDI figure in the western border regions is not least a result of the presence of Polish and Hungarian capital. Despite promising developments, Ukraine's performance in attracting FDI is still poor, which is

Fig. 52

FOREIGN DIRECT INVESTMENT

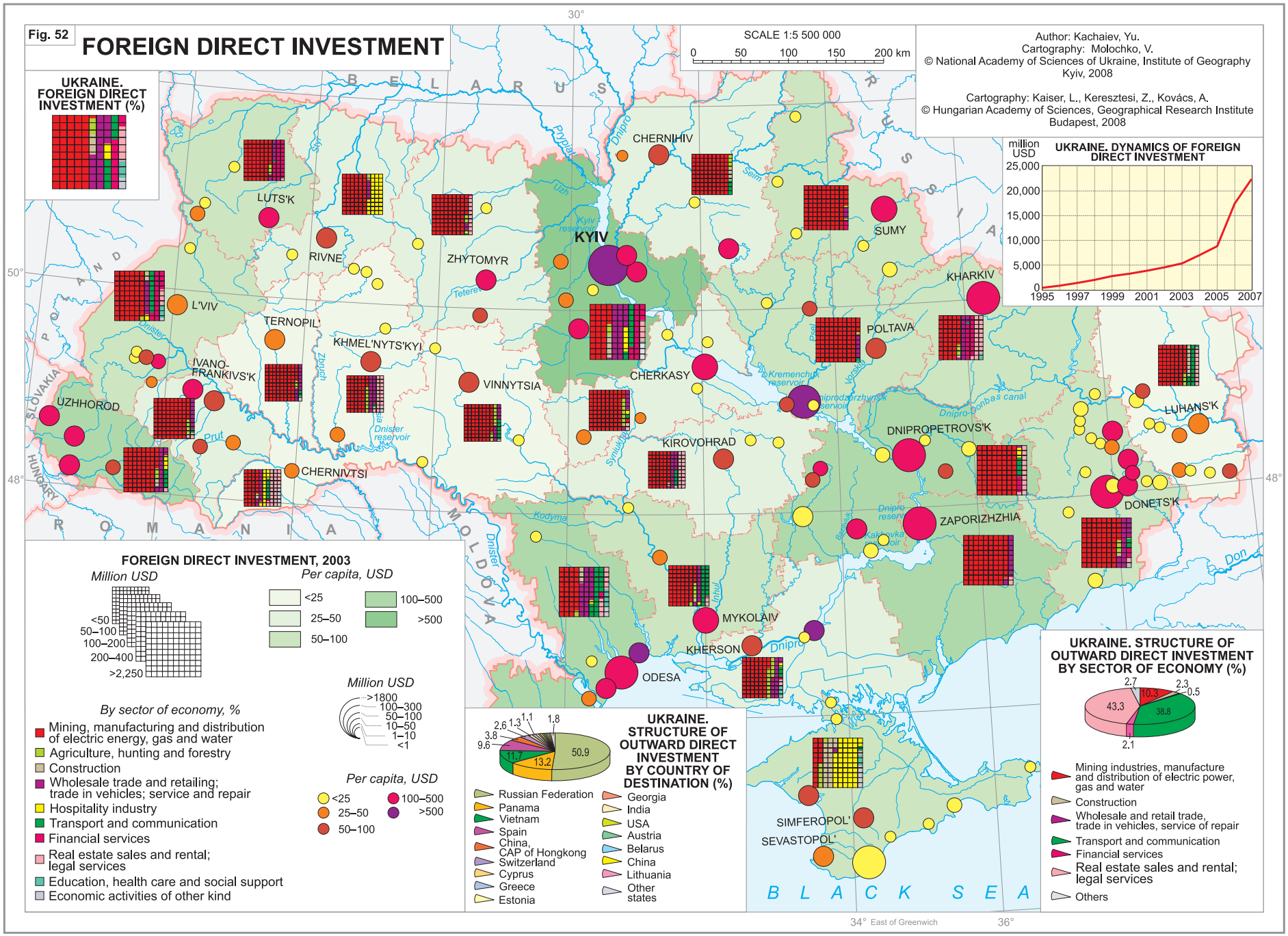


Table 15. ***Foreign direct investment in Ukraine by country (2003–2007)***

	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
	In million USD					In %				
Total	5,604.6	6,946.5	8,797.4	17,399.2	22,433.7	100.0	100.0	100.0	100.0	100.0
USA	982.4	1,059.0	1,207.8	1,383.8	1,360.0	17.5	15.2	13.7	8.0	6.1
Cyprus	541.6	1,023.9	1,115.0	2,069	3,236.6	9.7	14.7	12.7	11.9	14.4
United Kingdom	533.3	723.2	938.6	1,341.4	1,699.9	9.5	10.4	10.7	7.7	7.6
Germany	414.2	448.7	603.5	5,466.2	5,690.1	7.4	6.5	6.9	31.4	25.4
Netherlands	401.1	485.4	564.9	888.8	1,692.2	7.2	7.0	6.4	5.1	7.5
Virgin Islands	359.3	318.3	684.9	678.0	883.7	6.4	4.6	7.8	3.9	3.9
Russian Federation	334.8	385.8	511.0	873.8	1,077.9	6.0	5.6	5.8	5.0	4.8
Switzerland	283.5	324.4	430.4	395.6	566.5	5.1	4.7	4.9	2.3	2.5
Austria	226.1	258.9	352.6	1,489.2	1,782.3	4.0	3.7	4.0	8.6	7.9
South Korea	172.1	172.4	172.4	172.2	..	3.1	2.5	2.0	1.0	..
Poland	..	..	198.6	235.2	380.0	..	..	2.3	1.4	1.7
Hungary	..	..	196.4	194.5	347.5	..	..	2.2	1.1	1.5
France	..	..	..	..	873.2	..	..	..	..	3.9
Other countries	1,356.2	1,746.5	1,821.2	2,211.0	2,843.8	24.1	25.1	20.6	12.6	12.8

Remark: Volume of direct investment as of 1st April of the given years.
Source: www.ukrstat.gov.ua

particularly apparent when expressed in FDI statistics in comparison with the neighbouring new EU member states: Ukraine 168, Poland 1,502, Hungary 3,693 USD per capita FDI inflow (2004). "European integration could help Ukraine to increase its attractiveness to foreign investors" (Mayhew 2007), along with a full implementation of the EU–Ukraine Action Plan and the stabilisation of democracy.

Industry

Industrial growth in Ukraine stopped in 1990, and there was an even more abrupt deterioration of the sector in the years following. This pace of decline only slowed down in 1995, with the first steps towards a recovery taking place from 1999 onwards. This turned into a real growth in output that reached 12.9% in 2000 and 16% in 2005. Industry continues to play a leading role in the country's national economy. The sector produces about half of gross domestic output (GDP), employing 27.7% of the labour force and representing 35.5% of fixed assets. In spite of the recent crisis situation the industrial potential of the country may be the fundamental bedrock for future economic progress and a decisive factor in urban and regional development (*Figure 53*). With respect to the volume of actual industrial production, the following oblasts had the highest shares: Donets'k (25.4%), Dnipropetrovs'k (15.7%) Zaporizhzhia (9.1%), Luhans'k (8.1%), and Poltava (5.9%).

Since 2000, statistical data have been published according to a standard 'Classification of Economic Activities'. Industrial data is calculated through adding-up economic activity in the branches of raw materials extraction, manufacturing, and the production and distribution of electricity, gas and water. *Figure 54* shows the volume of actual industrial production by branch in 2004. Since 1990, relevant structural shifts have occurred, attributable to the changing specific weight of the leading branches within the total industrial output, according to the indicator values. The most important sectors of Ukrainian industry are iron and steel smelting, non-ferrous metallurgy, food production and the processing of agricultural produce, machinery engineering, the fuel and energy industry, the production of building materials, and light industry.

The share of the machinery industry dropped dramatically, from 30.5% in 1990, down to 13.4% in 2004. This branch has suffered particularly badly from the disintegration of the USSR, previously producing weapons, equipment (for the mining, iron and steel, chemicals and power generation industries), agricultural machinery, sea vessels, aircraft, and consumer electronics for the internal Soviet market.

Light industries also experienced considerable shrinkage. Between 1990 and 2004 this branch saw the most remarkable loss of output and decline in its specific weight within the industrial production ratio; from 10.8% in 1990 down to 1.2% in 2004. A low level of automation, the loss of reliable markets

Fig. 53

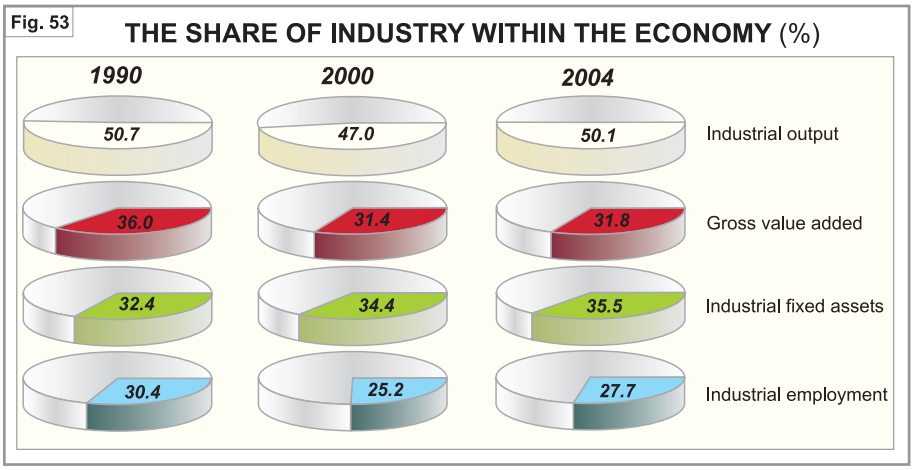
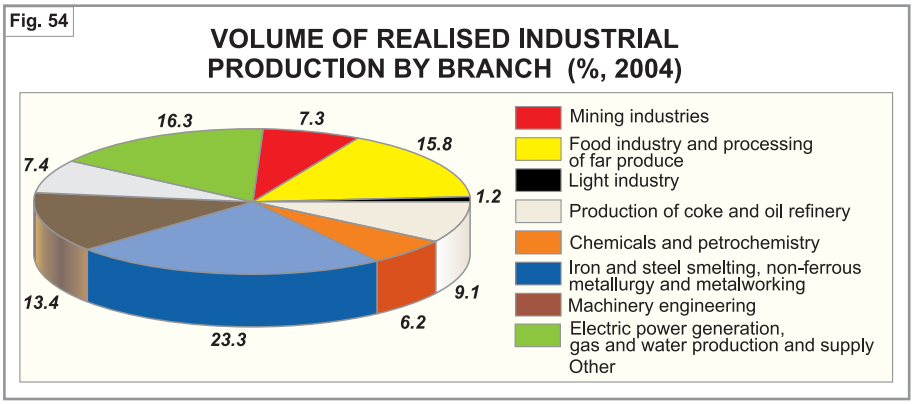


Fig. 54



and the emergence of unprotected domestic producers have effectively driven this branch to bankruptcy. This has been the price paid for the liberalisation of foreign trade and the inundation of the Ukrainian market with imported commodities.

At the same time the shares of the electricity generation and fuel production industry, along with iron and steel melting have grown considerably. This shift has caused an increased alteration in the structure of the industrial sector. There is prevalence towards branches that are raw material and energy intensive, with the outcome that environmental pollution is growing. In 2004 the electricity generation and fuel production industry, along with metallurgy together provided 48.7% of total industrial output, whereas the shares of machinery engineering, light industries and food processing amounted to only 30.4%. It should be noted that the share of heavy industry more than doubled over the period 1991–2004 partly owing to overpricing the output and also due to the rising costs of production and a decline in retail prices.

Shrinkage in output volumes and their devaluation are characteristic of the food industry as well, albeit at a slower rate. Its specific weight within the volume of total industrial output dropped from 18.6% in 1990 to 15.8% in 2004. As of the start of 2004, the private ownership structure was overwhelming in the food industry and that for processing agricultural produce (96.6%). The only exception is the distillation of spirits, being a state monopoly.

It was the energy crisis that worst affected the industrial potential of Ukraine. Presently, the most salient trends and factors underpinning industry are high rates of industrial productivity resulting in output that exceeds 1990 levels; a favourable investment climate which may stimulate the modernisation of fixed industrial assets; and high levels of growth in the machinery industry, the main target for investment. Rising productivity of labour, i.e. economising living labour, whatever high contribution it makes to the efficiency of production, is only one of the several factors of improving efficiency, which also includes other spheres e.g. reduction of the value of raw materials and power sources.

High growth rates in the machinery industry represent a very progressive trend, determining the level of technological sophistication and act as a driving force in the economy. However, even these high rates are unable to improve the technical and technological basis of the economy. Quantitative changes must be accompanied by qualitative growth, i.e. a rise in the efficiency of production, and of the scientific and technical level of engineering.

Metallurgy is in a key position within Ukraine's industrial sector. Historically, the iron and steel industry emerged in the 19th century and was based on high-grade raw minerals found in abundance, namely, coal and metal-bearing ores such as ferrous and manganese, ores of rare metals (titanium, zirconium, etc.), of non-ferrous metals (nickel, bauxite, mercury) and of precious metals (gold).

A leading branch of metallurgy is iron and steel smelting, having first emerged in the Donets basin (the present Donets'k and Luhans'k oblasts) due to the presence of resources of coking coal, and later, along the Dnieper river (Dnipropetrovs'k and Zaporizhzhia oblasts) in the proximity of vast iron ore deposits (Kryvyi Rih basin, Belozerskyi district) and manganese ore fields (Nikopol' basin) (*Figure 55*). According to 2004 production figures for iron and steel, the sector had the following share within the industrial output of the respective oblasts: Dnipropetrovs'k, over 67%; Donets'k, 53%; Zaporizhzhia, over 46%; and Luhans'k, 21%. These four regions provide for more than 90% of the national production volume with the Donbas region alone having a 41% share (producing around 52% of total output in pig iron, 46% in steel and over 53% of rolled steel). The region along the Dnieper has a share of almost 54% within the output of ferrous metals, non-ferrous metals (aluminium and rare metals) and ferrous and manganese concentrates.

The metallurgical branch has a complex and extensive structure. Various activities include the extraction and enrichment of raw minerals, the production of metallurgical coke, as well as the smelting of various types of metals (pig iron, steel founded in open-hearth, Bessemer converters, and those produced by electrometallurgy). Further included is the production of rolled steel, cast iron, forged and other metal products. An intense development in Ukrainian metallurgy has promoted its expansion in the world market. A considerable amount of revenue from exports can be attributed to ferrous metals, and to a lesser extent to non-ferrous metals and metal products.

Metallurgy in Ukraine is facing problems such as the urgent need for technologi-

cal modernisation, so that: global standards can be adopted to raise the competitiveness of the branch; to support development of related branches, such as the manufacture of building materials and the chemicals industry, making use of the waste output from primary production; and to ensure the ecological safety of the population and environmental protection.

The **food industry** is decisive for Ukraine's place in the international division of labour. Despite the current problems, the country continues to export food products to the former republics of the USSR (primarily to Russia), to the Middle East, China, and others. Ukraine produces food products like cereals, meat, fish, etc. for the international market and is increasing production of confectionery products, alcoholic drinks and vegetable oil.

Food processing occupies second place in industrial output, with 16.3% of total output and 13.4% of industrial employment. The branch has a ramifying structure with more than 40 types of production, embracing 9,200 enterprises.

The level of development in the food industry is closely related to the health of farming, and the levels, structure and productivity of agriculture. The leading segments of the food industry are those specialising in the production of flour and cereals, meat and milk production, the production of vegetable oil and fats, the sugar industry, the manufacture of confectionery products, wine and spirits, and the tobacco industry. The food industry has reached its highest levels of development in Vinnytsia, Kharkiv, Kyiv and Sumy oblasts (*Figure 56*).

Machinery engineering plays an important role, owing to its main function to supply the national economy with machinery (be that equipment, tools, instruments, etc.), vehicles, weapons for national defence purposes, consumer goods (such as home appliances), etc. This branch provides 13.4% of total industrial output and over 11,000 enterprises currently operate in the manufacture, and associated repair and installation of equipment. Around 22.7% of industrial workers are occupied in this sector, which is instrumental in the acceleration of technological progress and holds the solution to complex socio-economic tasks.

More than 100 types of manufacturing make up the profile of contemporary machinery engineering. Due to objective economic factors, and for historical reasons too, the machinery engineering sector has always been considered to be the first priority for the national economy and branch specialisations had specific features. The largest enterprises are the plant at Novokramators'k, and heavy engineering factories at Mariupol', Slovians'k, Dnipropetrovs'k, Kryvyi Rih, Donets'k, and Luhans'k (*Figure 57*).

Large centres of engineering associated with *power generation* are the turbine works in Kharkiv (manufacturing extra powerful turbines for nuclear power plants), and the equipment plants in Tokmak (Zaporizhzhia oblast), and in Pervomais'k (Mykolaiv oblast).

The *vehicle engineering* sector produces diesel and electric locomotives, railway rolling stock, river and sea vessels, aircraft, lorries and buses. Large assembly works maintain technological links with many factories. Diesel and electric locomotives are manufactured in Luhans'k and Kharkiv, and railway rolling stock is assembled in Dniprodzerzhynsk and Kremenchuk. A massive shipbuilding branch has developed since the late 18th century with Mykolaiv, Kherson and Kerch as the main centres of sea vessel construction and Kyiv and Zaporizhzhia for river vessels. Ship repair facilities are also to be found in many ports and harbours.

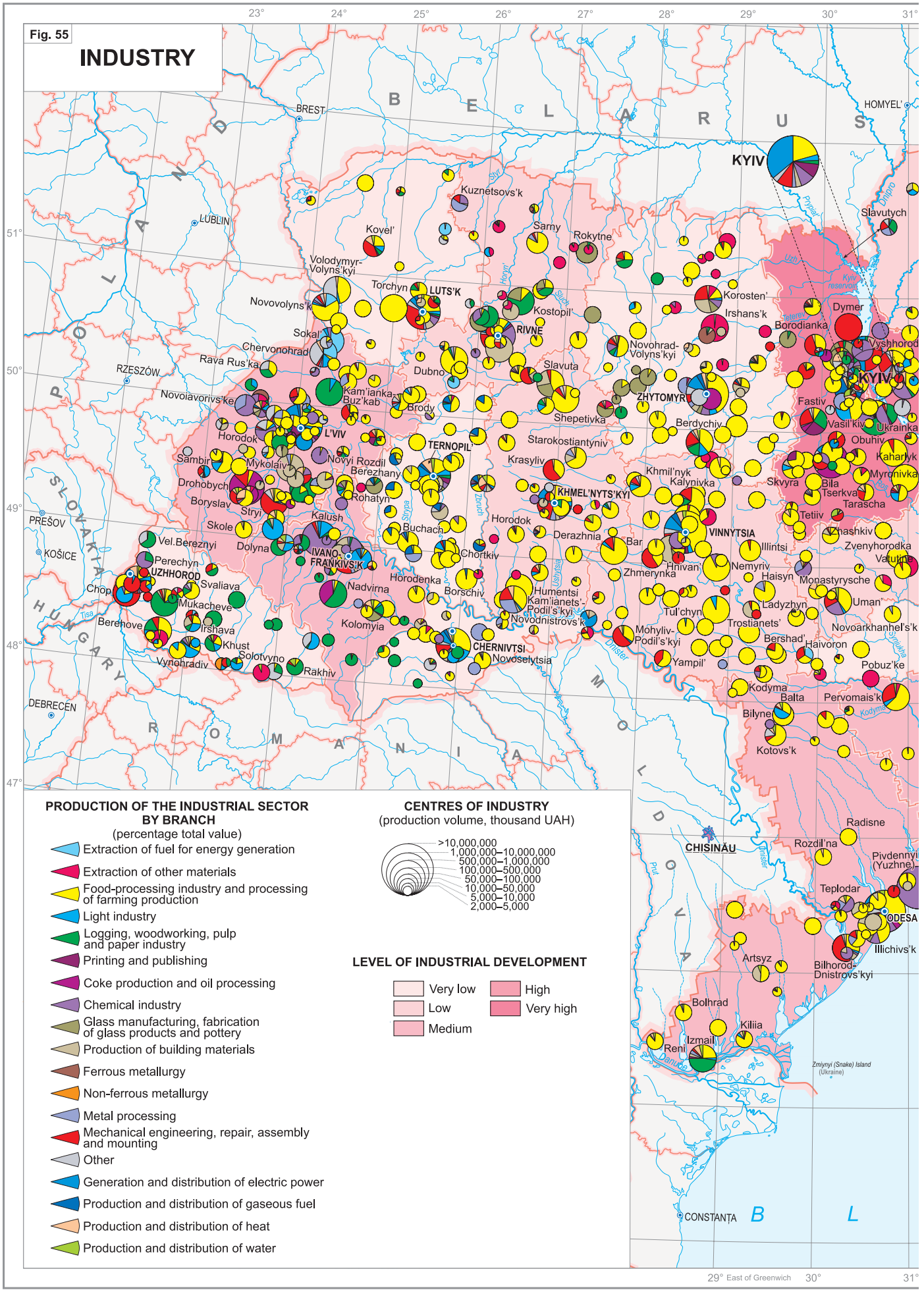
Aircraft construction is a highly prestigious branch of the national economy and is broad-based. The A.K. Antonov Design Bureau and Construction Works operate in Kyiv. Passenger-carrying and transport aircraft have been designed and many of them constructed here. The most famous transport aircraft are the An-124 (Ruslan) and An-225 (Mriya, or under the NATO reporting name, Cossack). The latter is the world's heaviest and largest aircraft. Aeroplanes are also assembled in Kharkiv and aircraft engines are manufactured in Zaporizhzhia.

Space and rocket technology is another priority field of expertise for the national economy. Yuzhnoye Design Bureau (where Soviet intercontinental ballistic missiles used to be assembled) still operates in Dnipropetrovs'k. Zenit, a space launch vehicle (carrier rocket) for delivering earth satellites into orbit in a most economical and ecologically clean mode is produced here.

In recent years the *motor industry* has been given a fresh impetus in Ukraine. Cars are produced in Zaporizhzhia and Luhans'k, lorries in Kremenchuk, and buses in L'viv. There are assembly plants in Odesa, Cherkasy, Chernihiv and in other locations.

Fig. 55

INDUSTRY



PRODUCTION OF THE INDUSTRIAL SECTOR BY BRANCH

(percentage total value)

- Extraction of fuel for energy generation
- Extraction of other materials
- Food-processing industry and processing of farming production
- Light industry
- Logging, woodworking, pulp and paper industry
- Printing and publishing
- Coke production and oil processing
- Chemical industry
- Glass manufacturing, fabrication of glass products and pottery
- Production of building materials
- Ferrous metallurgy
- Non-ferrous metallurgy
- Metal processing
- Mechanical engineering, repair, assembly and mounting
- Other
- Generation and distribution of electric power
- Production and distribution of gaseous fuel
- Production and distribution of heat
- Production and distribution of water

CENTRES OF INDUSTRY

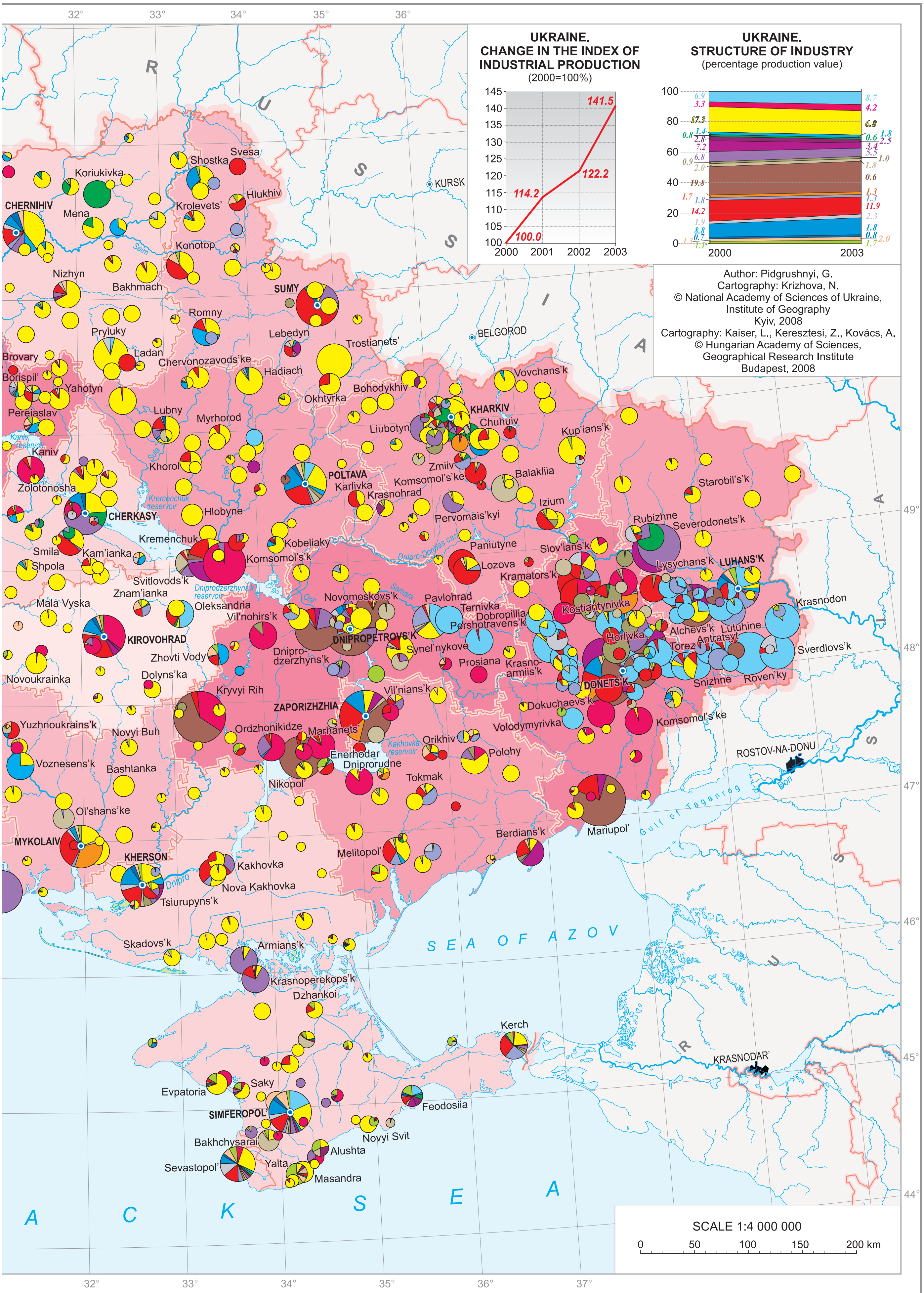
(production volume, thousand UAH)

- >10,000,000
- 1,000,000–10,000,000
- 500,000–1,000,000
- 100,000–500,000
- 50,000–100,000
- 10,000–50,000
- 5,000–10,000
- 2,000–5,000

LEVEL OF INDUSTRIAL DEVELOPMENT

- Very low
- Low
- Medium
- High
- Very high

29° East of Greenwich 30° 31°


UKRAINE.
CHANGE IN THE INDEX OF INDUSTRIAL PRODUCTION
(2000=100%)
145
140
135
130
125
120
115
110
105
100
2000
2001
2002
2003
100.0
114.2
122.2
141.5
UKRAINE.
STRUCTURE OF INDUSTRY
(percentage production value)
100
80
60
40
20
0
2000
2003
Author: Pidgrushnyi, G.
Cartography: Krizhova, N.
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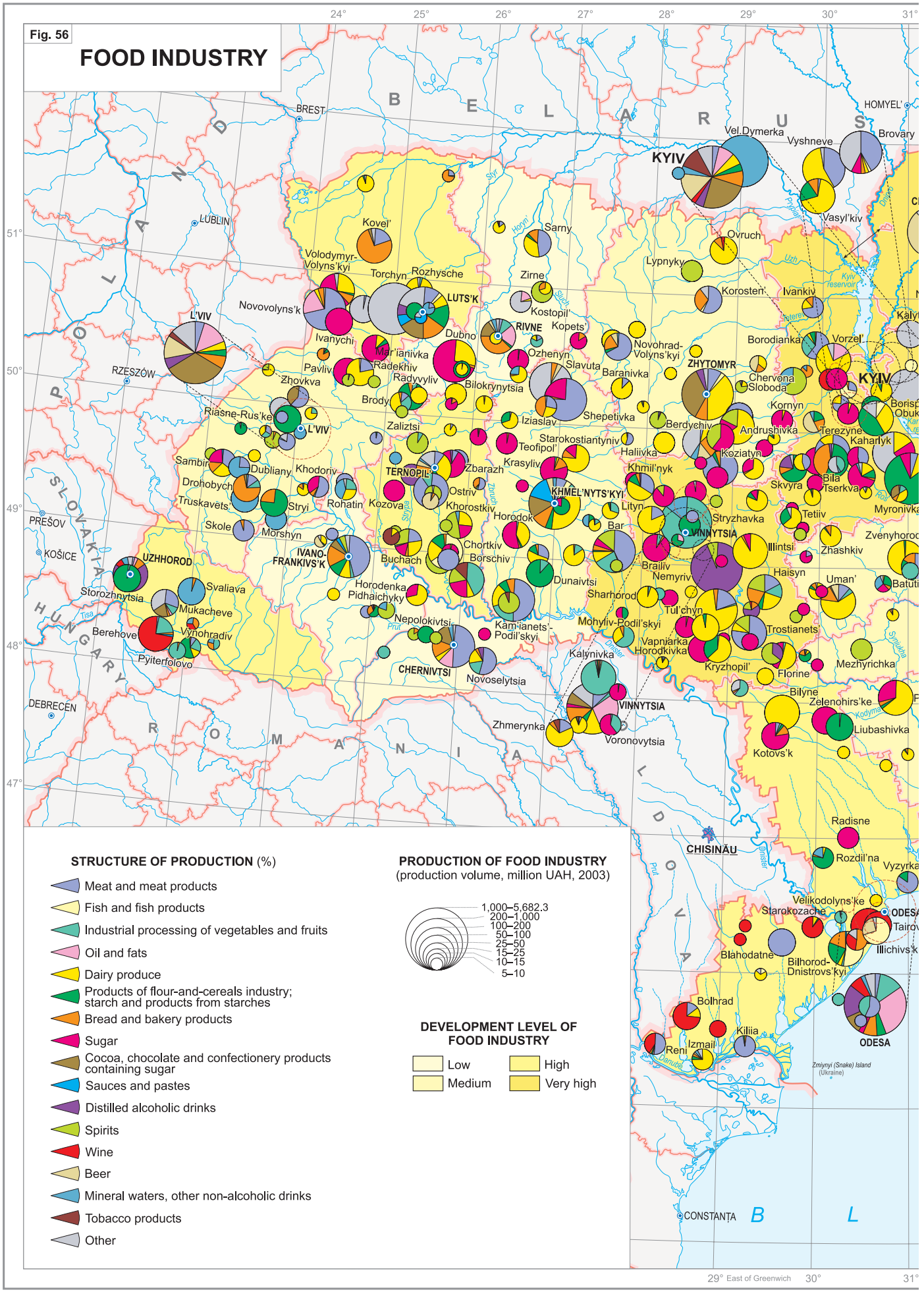
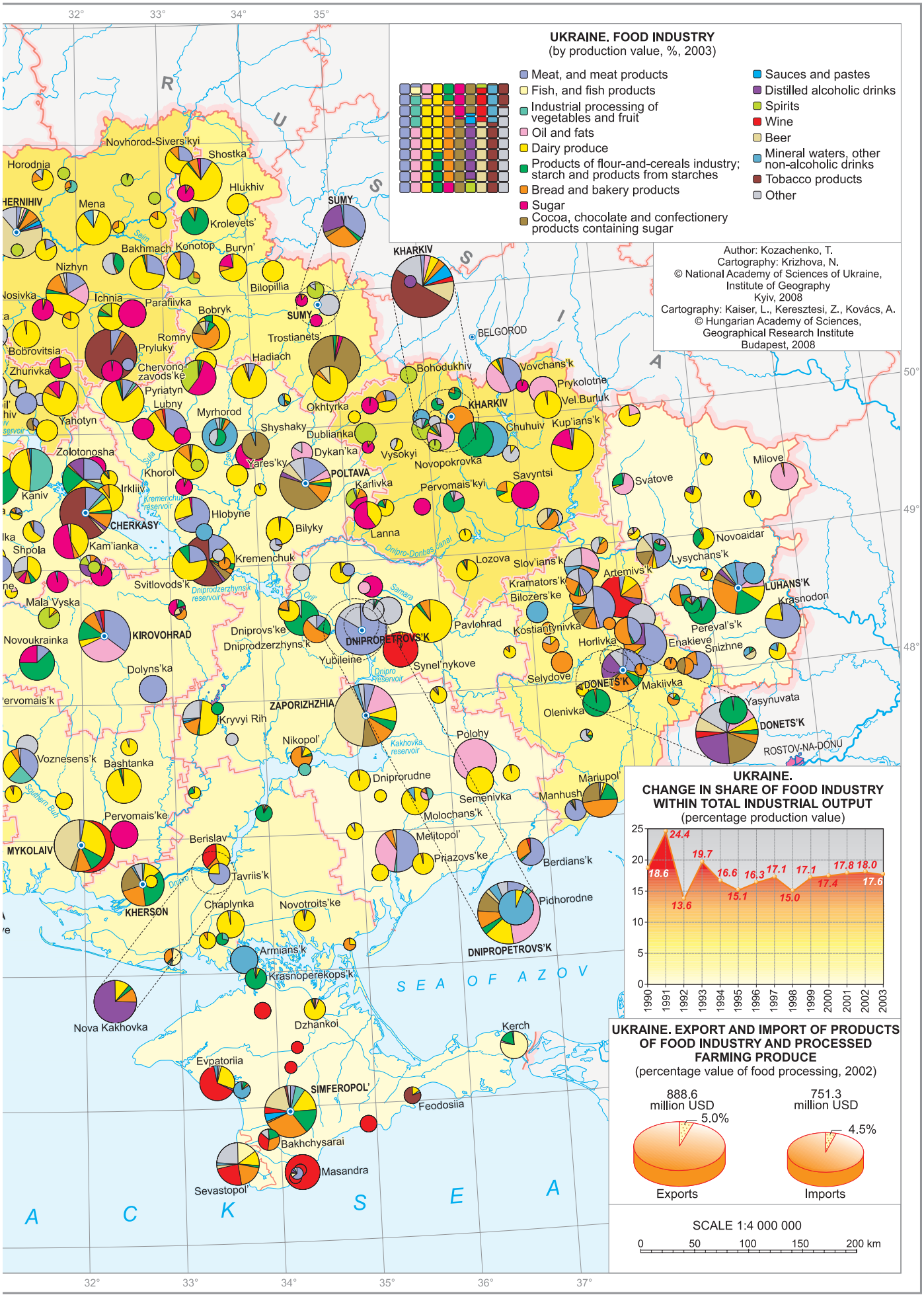
SCALE 1:4 000 000
0
50
100
150
200 km
32°
33°
34°
35°
36°
37°
44°
45°
46°
47°
48°
49°
KURSK
BELGOROD
ROSTOV-NA-DONU
KRASNODAR'
SEA OF AZOV
Gulf of Taganrog
CHERNIHIV
Koriukivka
Mena
Shostka
Svesa
Krolevets'
Hlukhiv
Konotop
Nizhyn
Bakhmach
SUMY
Romny
Pryluky
Lebedyn
Trostianets'
Ladan
Chervonozavods'ke
Hadiach
Brovary
Borispil'
Yahotyn
Okhtyrka
Bohodukhiv
Vovchans'k
KHARKIV
Chuhuiv
Pereiaslav
Lubny
Myrhorod
Liubotyn
Kup'ians'k
Kaniv
Khorol
POLTAVA
Zmiiv
Balakliia
Starobil's'k
Zolotonosha
Karlivka
Komsomol's'ke
Krasnohrad
CHERKASY
Hlobyne
Pervomais'kyi
Izium
Rubizhne
Severodonets'k
Kremenchuk
Kobeliaky
Paniutyne
Slov'ians'k
Smila
Kam'ianka
Komsomol's'k
Lozova
Lysychans'k
LUHANS'K
Shpola
Svitlovods'k
Kramators'k
Znam'ianka
Novomoskovs'k
Pavlohrad
Krasnodon
Mala Vyska
Oleksandria
Ternivka
Kostiantynivka
Vil'nohirs'k
Dobropillia
Pershotravens'k
Alchevs'k
Lutuhine
KIROVOHRAD
DNIPROPETROVS'K
Horlivka
Antratsyt
Zhovti Vody
Dnipro-dzerzhyns'k
Synel'nykove
Torez
Sverdlovs'k
Novoukrainka
Dolyns'ka
Prosiana
Krasno-armiis'k
Snizhne
Roven'ky
Kryvyi Rih
Vil'nians'k
DONETS'K
ZAPORIZHZHIA
Dokuchaevs'k
Yuzhnoukrains'k
Novyi Buh
Ordzhonikidze
Volodymyrivka
Komsomol's'ke
Marhanets'
Orikhiv
Voznesens'k
Bashtanka
Enerhodar
Dniprorudne
Polohy
Nikopol'
Tokmak
Ol'shans'ke
MYKOLAIV
Berdians'k
Mariupol'
KHERSON
Melitopol'
Kakhovka
Nova Kakhovka
Tsiurupyns'k
Skadovs'k
Armians'k
Krasnoperekops'k
Dzhankoi
Kerch
Saky
Evpatoria
SIMFEROPOL'
Feodosiia
Novyi Svit
Bakhchysarai
Alushta
Sevastopol'
Yalta
Masandra
Kakhovka reservoir
Dniprodzerzhyns'k reservoir
Kremenchuk reservoir
Kaniv reservoir
Dnipro
Dnipro-Donbas canal
Samara
Seim
Sula
Psel
Orel
Don
R U S S I A
S E A
B L A C K   S E A

Fig. 56

FOOD INDUSTRY




UKRAINE. FOOD INDUSTRY
(by production value, %, 2003)
Meat, and meat products
Fish, and fish products
Industrial processing of vegetables and fruit
Oil and fats
Dairy produce
Products of flour-and-cereals industry; starch and products from starches
Bread and bakery products
Sugar
Cocoa, chocolate and confectionery products containing sugar
Sauces and pastes
Distilled alcoholic drinks
Spirits
Wine
Beer
Mineral waters, other non-alcoholic drinks
Tobacco products
Other
Author: Kozachenko, T.
Cartography: Krizhova, N.
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Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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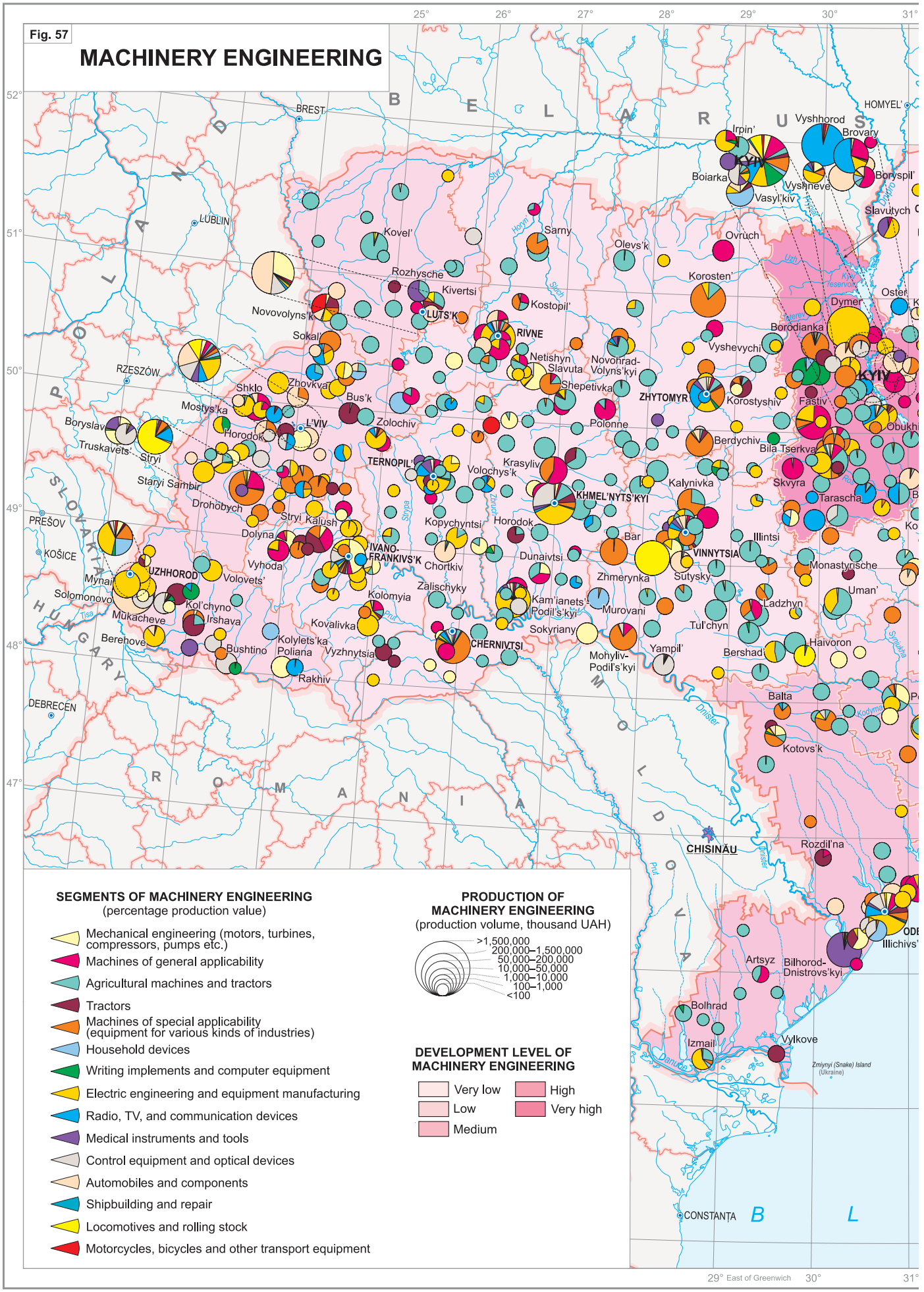
UKRAINE.
CHANGE IN SHARE OF FOOD INDUSTRY WITHIN TOTAL INDUSTRIAL OUTPUT
(percentage production value)
24.4
18.6
13.6
19.7
16.6
16.3
15.1
17.1
15.0
17.1
17.4
17.8
18.0
17.6
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
UKRAINE. EXPORT AND IMPORT OF PRODUCTS OF FOOD INDUSTRY AND PROCESSED FARMING PRODUCE
(percentage value of food processing, 2002)
888.6 million USD
5.0%
Exports
751.3 million USD
4.5%
Imports
SCALE 1:4 000 000
0 50 100 150 200 km
Novhorod-Sivers'kyi
Shostka
Horodnia
Hlukhiv
Mena
Krolevets'
Bakhmach
Konotop
Buryn'
Nizhyn
Bilopillia
Parafiivka
Ichnia
Bobryk
Romny
Pryluky
Trostianets'
Hadiach
Chervono-zavods'ke
Pyriatyn
Lubny
Myrhorod
Yahotyn
Zolotonosha
Shyshaky
Dublianka
Dykan'ka
Yares'ky
Khorol
Irkliiv
Kaniv
Kremenchuk reservoir
CHERKASY
Hlobyne
Bilyky
Kam'ianka
Kremenchuk
Svitlovods'k
Dniprodzerzhyns'k reservoir
Mala Vyska
Shpola
KIROVOHRAD
Novoukrainka
Dolyns'ka
Dniprovs'ke
Dniprodzerzhyns'k
Yubileine
DNIPROPETROVS'K
Synel'nykove
Dnipro reservoir
Pavlohrad
Samara
Orel
Dnipro-Donbas canal
POLTAVA
Karlivka
Lanna
Okhtyrka
SUMY
Bohodukhiv
KHARKIV
BELGOROD
Vovchans'k
Prykolotne
Vel.Burluk
Kup'ians'k
Chuhuiv
Vysokyi
Novopokrovka
Pervomais'kyi
Savyntsi
Svatove
Milove
Novoaidar
Lysychans'k
Slov'ians'k
Lozova
Kramators'k
Bilozers'ke
Artemivs'k
LUHANS'K
Krasnodon
Pereval's'k
Kostiantynivka
Horlivka
Enakieve
Snizhne
DONETS'K
Makiivka
Selydove
Olenivka
Yasynuvata
ROSTOV-NA-DONU
ZAPORIZHZHIA
Kryvyi Rih
Nikopol'
Kakhovka reservoir
Polohy
Dniprorudne
Semenivka
Molochans'k
Mariupol'
Manhush
Berdians'k
Melitopol'
Priazovs'ke
Pidhorodne
DNIPROPETROVS'K
Voznesens'k
Bashtanka
Southern Bug
Pervomais'ke
MYKOLAIV
Berislav
Tavriis'k
Dnipro
KHERSON
Chaplynka
Novotroits'ke
Armians'k
Krasnoperekops'k
Nova Kakhovka
Dzhankoi
Kerch
Evpatoriia
SIMFEROPOL'
Feodosiia
Bakhchysarai
Masandra
Sevastopol'
SEA OF AZOV
RUSSIA
UKRAINE
32°
33°
34°
35°
36°
37°
50°
49°
48°

Fig. 57

MACHINERY ENGINEERING



SEGMENTS OF MACHINERY ENGINEERING
(percentage production value)

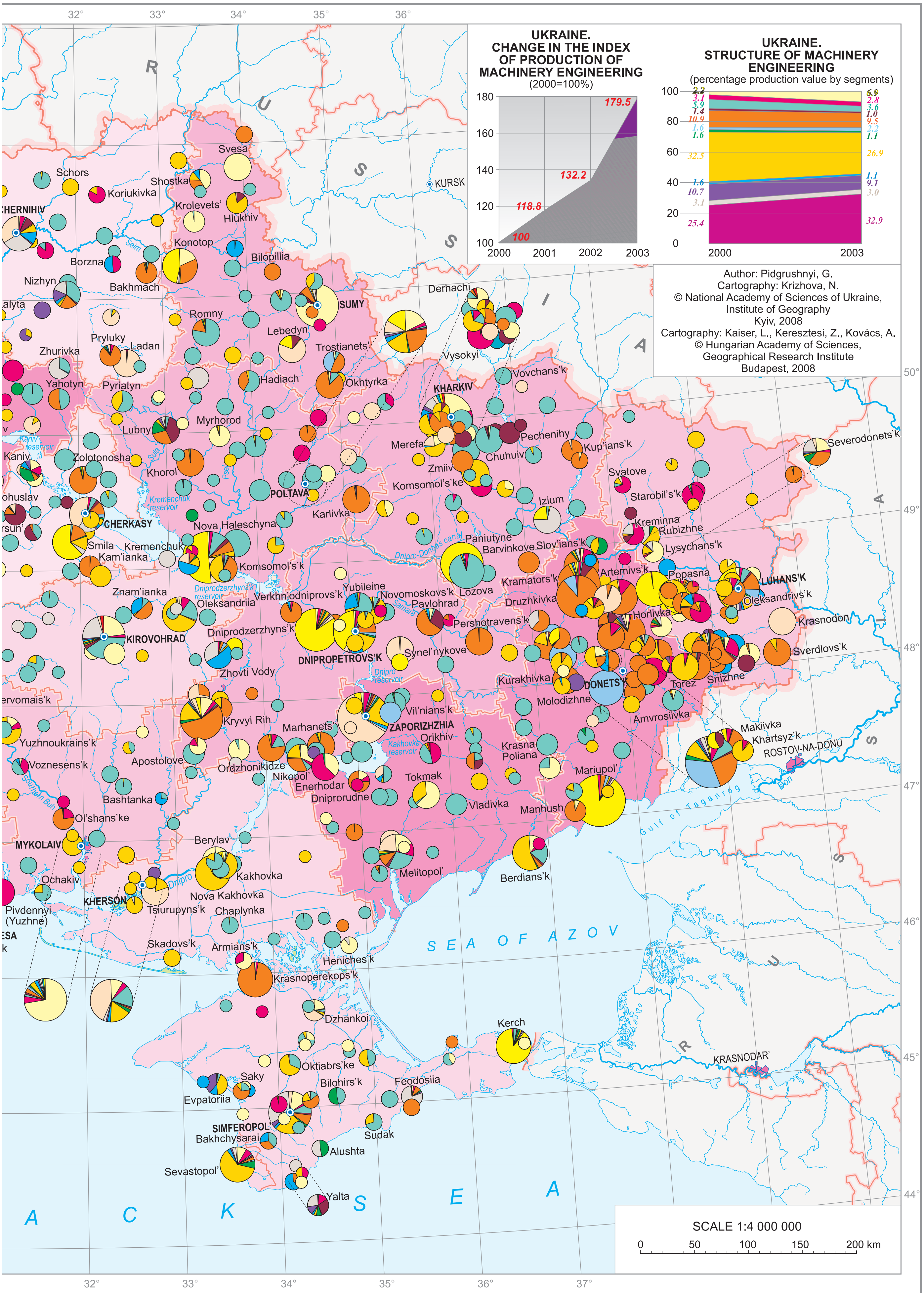
- Mechanical engineering (motors, turbines, compressors, pumps etc.)
- Machines of general applicability
- Agricultural machines and tractors
- Tractors
- Machines of special applicability (equipment for various kinds of industries)
- Household devices
- Writing implements and computer equipment
- Electric engineering and equipment manufacturing
- Radio, TV, and communication devices
- Medical instruments and tools
- Control equipment and optical devices
- Automobiles and components
- Shipbuilding and repair
- Locomotives and rolling stock
- Motorcycles, bicycles and other transport equipment

PRODUCTION OF MACHINERY ENGINEERING
(production volume, thousand UAH)

- >1,500,000
- 200,000–1,500,000
- 50,000–200,000
- 10,000–50,000
- 1,000–10,000
- 100–1,000
- <100

DEVELOPMENT LEVEL OF MACHINERY ENGINEERING

- Very low
- Low
- Medium
- High
- Very high


UKRAINE.
CHANGE IN THE INDEX OF PRODUCTION OF MACHINERY ENGINEERING
(2000=100%)
180
160
140
120
100
2000
2001
2002
2003
100
118.8
132.2
179.5
UKRAINE.
STRUCTURE OF MACHINERY ENGINEERING
(percentage production value by segments)
100
80
60
40
20
0
2000
2003
2.2
3.1
5.9
1.4
10.9
1.6
1.6
32.5
1.6
10.7
3.1
25.4
6.9
2.8
3.6
1.0
9.5
2.2
1.1
26.9
1.1
9.1
3.0
32.9
Author: Pidgrushnyi, G.
Cartography: Krizhova, N.
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Kyiv, 2008
Cartography: Kaiser, L., Kereszturi, Z., Kovács, A.
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Budapest, 2008
SCALE 1:4 000 000
0
50
100
150
200 km
R
U
S
S
I
A
KURSK
ROSTOV-NA-DONU
KRASNODAR'
SEA OF AZOV
SEA
Gulf of Taganrog
Svesa
Schors
Shostka
Koriukivka
CHERNIHIV
Krolevets'
Hlukhiv
Konotop
Bilopillia
Borzna
Nizhyn
Bakhmach
SUMY
Romny
Lebedyn
Trostianets'
Pryluky
Ladan
Zhurivka
Yahotyn
Pyriatyn
Hadiach
Okhtyrka
Derhachi
Vysokyi
Vovchans'k
KHARKIV
Lubny
Myrhorod
Merefa
Pechenihy
Kup'ians'k
Chuhuiv
Kaniv
Zolotonosha
Khorol
Zmiiv
Komsomol's'ke
Svatove
Starobil's'k
Severodonets'k
POLTAVA
Karlivka
Izium
CHERKASY
Nova Haleschyna
Kreminna
Rubizhne
Smila
Kremenchuk
Kam'ianka
Paniutyne
Barvinkove
Slov'ians'k
Lysychans'k
Komsomol's'k
Kramators'k
Artemivs'k
Popasna
LUHANS'K
Znam'ianka
Oleksandriia
Verkhn'odniprovs'k
Yubileine
Novomoskovs'k
Pavlohrad
Lozova
Druzhkivka
Oleksandrivs'k
Horlivka
Krasnodon
KIROVOHRAD
Dniprodzerzhyns'k
Pershotravens'k
DNIPROPETROVS'K
Synel'nykove
Sverdlovs'k
Zhovti Vody
Kurakhivka
DONETS'K
Torez
Snizhne
Molodizhne
Amvrosiivka
Kryvyi Rih
Marhanets'
ZAPORIZHZHIA
Vil'nians'k
Orikhiv
Makiivka
Khartsyz'k
Yuzhnoukrains'k
Apostolove
Ordzhonikidze
Krasna Poliana
Voznesens'k
Nikopol'
Enerhodar
Tokmak
Mariupol'
Bashtanka
Dniprorudne
Vladivka
Manhush
Ol'shans'ke
MYKOLAIV
Berylav
Melitopol'
Berdians'k
Ochakiv
Kakhovka
KHERSON
Nova Kakhovka
Pivdennyi (Yuzhne)
Tsiurupyns'k
Chaplynka
Skadovs'k
Armians'k
Heniches'k
Krasnoperekops'k
Dzhankoi
Kerch
Oktiabrs'ke
Saky
Bilohirs'k
Feodosiia
Evpatoriia
SIMFEROPOL'
Bakhchysarai
Sudak
Alushta
Sevastopol'
Yalta
Dnipro
Southern Buh
Don
Seim
Sula
Psel
Samara
Dnipro-Donbas canal
Kaniv reservoir
Kremenchuk reservoir
Dniprodzerzhyns'k reservoir
Dnipro reservoir
Kakhovka reservoir
32°
33°
34°
35°
36°
37°
44°
45°
46°
47°
48°
49°
50°

The manufacturing of vehicles involves 20 companies. Tractors are assembled in Kharkiv, where engines and chasses are also produced. Accessories are made in Kyiv, Vinnytsia and Khmel'nits'kyi. Agricultural mechanical engineering, electrical engineering and the production of equipment for different uses are the growing branches of manufacturing. In contrast, precision engineering, i.e., radio-electronics, IT, along with the manufacture of telecommunications equipment, and instruments, are lagging behind.

The **chemicals industry** plays an important role in economic development. Together with petrochemical firms, 3,300 companies are involved in this sector, sharing 6.4% of GDP and 5.5% of industrial employment.

The development of this branch of the economy is promoted by rich resources of basic raw materials. They include mineral resources, and waste materials from the metallurgy, timber and woodworking sectors. The chemicals industry has a wide range of specialisms and of them, those processing extracted mineral resources are of foremost importance. Potash salt is mined at Kalush (Ivano Frankivs'k oblast) and Stebnyk (L'viv oblast), rock salt is extracted at Solotvino (Transcarpathian oblast), Artemivs'k and Slavians'k, and sulphur deposits are worked at Rozdil and Novoiavorivs'ke (L'viv oblast).

The manufacture of *mineral fertilisers* is a special segment of the chemicals industry. Nitrogen fertiliser plants are located with the coke and coal processing sectors in Rivne, Lysychans'k, Horlivka, Dniprodzerzhyns'k, Zaporizhzhia and Cherkasy. Phosphorus fertilisers are produced from imported raw materials in factories in Odesa, Vinnytsia, Sumy, Konstantynivka, and others.

One of the longest established sectors in chemicals manufacturing is *soda making*. This industry is confined to areas with rock salt deposits, limestone quarries and fuel sources, and its centres are in Slovians'k, Lysychansk and Krasnoperekops'k. Caustic soda and chlorine is produced at Kalush (Ivano Frankivs'k oblast).

The *paint and varnish industry* also belongs to the 'traditional' segment of the chemicals industry. The first factories appeared in the mid-19th century at L'viv and Odesa. The largest paint and varnish plants are in Kyiv, Dnipropetrovs'k, L'viv and Odesa, and there is a miniate factory in Kryvyi Rih.

The *manufacture of plastics, synthetic resins and fibres* are key segments of industry for the economic development of the country. They are located near to oil wells and refineries, coal mines and processing plants. The largest factories for plastics and synthetic fibres are located in Donets'k, Dniprodzerzhyns'k, Zaporizhzhia, Pervomaisk and Sieverodonets'k, and those for synthetic fibres in Kyiv, Chernihiv, Cherkasy and Zhytomyr.

The *petrochemicals and rubber-metal industry* is a relatively young segment within chemicals manufacturing and the development of the latter only started in recent decades. It is based around the refining of oil and gas, and imported rubber (synthetic and natural). Petrochemical plants and oil refineries are located close to one another (Kremenchuk, Kherson and Borislav). There are ca. 30 asbestos rubber plants in Ukraine. Dneproshina (Dnipropetrovs'k) is the largest tyre manufacturer on the territory of the former USSR. Rubber-metal products and tyres are made in Bila Tserkva, and there are large asbestos rubber plants in Lysychansk, Sumy, Zaporizhzhia, Odesa and Kharkiv.

The manufacture of fine chemicals essentially takes place within the pharmaceutical sector. They are as a rule located in large urban centres with a high concentration of academic institutions and scientific cadres (Kyiv, Kharkiv, Odesa, L'viv and Dnipropetrovs'k). The level of development in this segment is lagging far behind the needs of the medical sector.

The chemicals industry requires profound innovation, including the adoption of energy-saving and waste-reducing technologies.

During the recent period, significant shifts have taken place within the structure and spatial organisation of the **construction industry** in Ukraine. They are closely allied with the processes of transition to a market economy, the privatisation of state owned assets, and stem from the sectoral problems arising from the cut in financing, previously provided by the state as a traditional customer. Of construction projects completed in 2003 by building contractors one quarter were located in Kyiv and Kyiv oblast, with its ever-growing boom in construction activities. An intensifying spatial differentiation is a major characteristic feature of construction in contemporary Ukraine.

Trends in the dynamics of gross indicators of the construction industry have been accompanied with changes in the ownership of the projects under development. The percentage of buildings in state ownership diminished from 71.7% to 39.6%, whilst the share of private and joint public–private ownership increased (from 4.6% to 11.9% and from 23.7% to 46.8%, respectively). A positive change that has taken place in the construction sector has been the technological modernisation of the firms operating in this sector.

Energy

The fuel and energy complex (**fuel extraction** and **power generation**) is one of the most dynamic sectors of the national economy and, in spite of the economic difficulties of late combined with a recent decline in output, it continues to play a very important role in the Ukrainian economy. The main feature of the Ukrainian energy sector is the large dependency on foreign sources for its energy supplies. With the exception of coal reserves in the Donets'k basin (with an annual output of 80 million tons, and domestic consumption of 66 million tons), nearly 90% of fuel (namely, natural gas and crude oil) is imported from Russia. Due to this high dependency on imports, the stability of the energy supply and the ensuing energy consumption of the country are far from the desired level. Prior to its independence, Ukraine received energy supplies in exchange for agricultural and industrial products. These days the country has to cope with prices set by the international markets, instead of the previously abundant Soviet supply. Ukraine's energy network forms a unified system directly connected to Russia's sizeable network, as a by-product of the country's Soviet past. Consequently, Ukraine has been closely integrated with Russia in terms of both gas and oil.

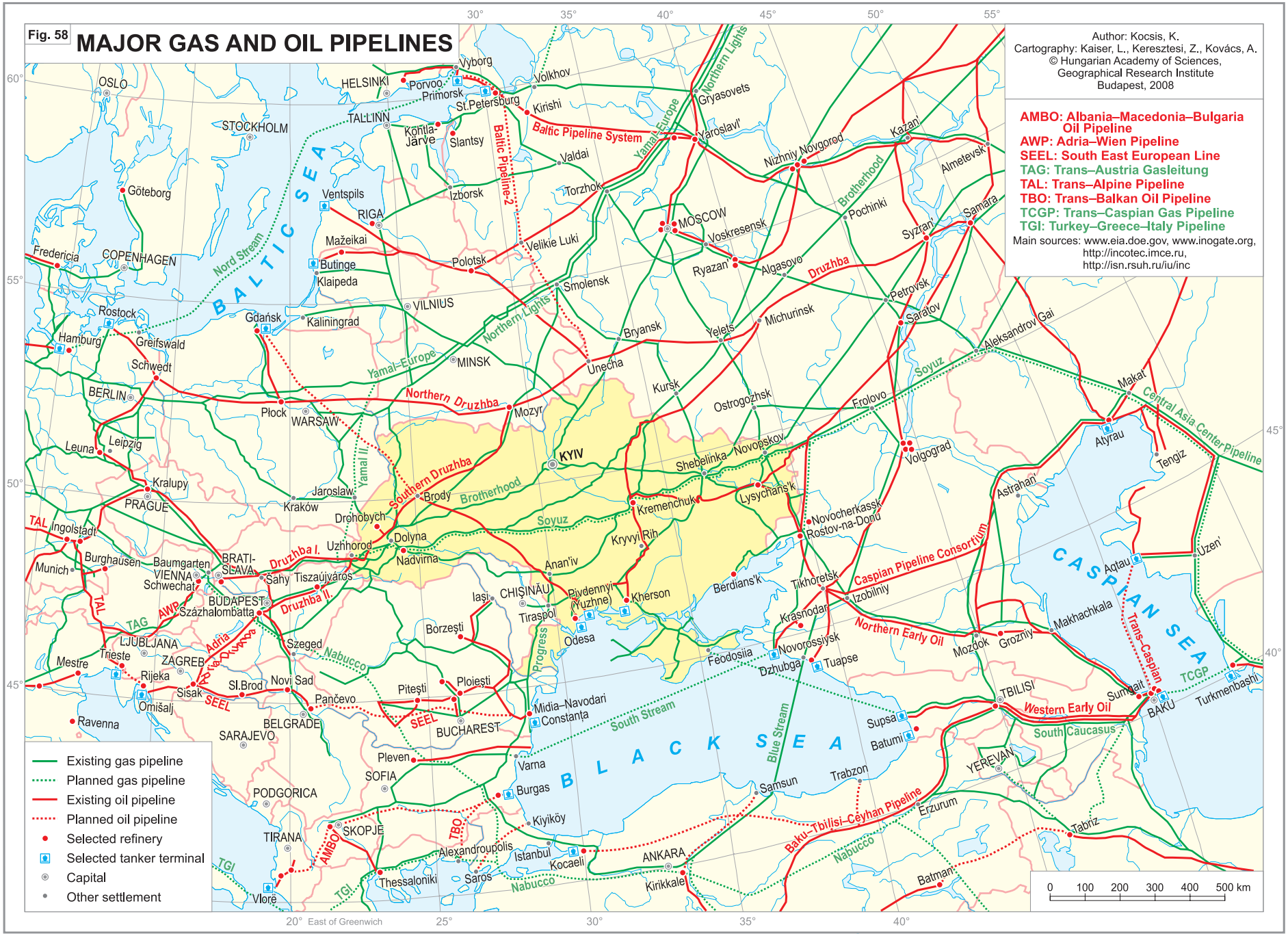
Within the sphere of fuel extraction, it is **coal** mining which is of greatest significance in Ukraine, where workable reserves exceed 117 billion tons. Today, annual coal output is ca. 90 million tons, which is matched to the current demands of the national economy. The coal industry is presently in a painstaking stage in its transformation. The sector is predominantly run by state-owned enterprises and incorporates mining, the processing of output and trade in coal. Small and medium-sized private companies have also formed local ventures involved in extracting coal, its separation and processing. At the same time, a number of inefficient collieries, or those mining fields whose reserves are dwindling, are to be closed down and there are more than 100 such collieries in Ukraine. In early 1990s there operated 280 collieries and 7 opencast sections in Ukraine where coal was extracted; 91.5% of coal production came from the Donets' basin (e.g. Donets'k, Makiivka, Horlivka and Krasnyi Luch) and ca. 6% from the L'viv–Volhynian basin (e.g. Chervonohrad). Reconstruction of separator plants is under way; they were among the technologically most progressive plants in the world during the 1970s. Special mention should be made of lignite mining, which for the time being is completely neglected and supported neither by investment, nor innovation.

Demand for oil and gas in Ukraine can be only partially met by domestic extraction (crude oil: 6–7% of demand, natural gas: up to 20%) and the country relies on hydrocarbon imports, mostly from the Russian Federation and Turkmenistan. Hydrocarbon resources are currently mostly extracted on the Black Sea shelf and in the Sea of Azov, in Crimea, and in the Dnipro–Donets' depression in the northeast of the country.

Ukraine's production of **crude oil** is small (nearly 4 million tons in 2005) and the country imports most of its supplies from Russia. 32% of oil products are destined to be consumed by the transport sector and the same amount by industry. Oil products account for about 13% of final energy consumption. Ukraine has 8 refineries (e.g. Lysychans'k, Kremenchuk, Drohobych, Nadvirna and Kherson) and the majority (e.g. at Lysychans'k) have been privatised by Russian capital. The total capacity of these plants amounts to 60 million tons annually, but barely one third of this is utilised. The perspectives of modernisation of refineries are associated with the expansion of the raw material basis and the establishment of specialized machinery engineering. With a highly developed ***oil pipeline system***, Ukraine plays an important role as a transit country for Russian oil exports to Europe (*Figure 58*). The oil trunk-line system has a total length of 4,520 km and is operated by 31 pumping stations. The annual input capacity of the system is 120 million tons, and the output capacity is around 76 million tons. Crude oil is delivered from Russia and Kazakhstan to Ukrainian refineries, and also exported to Central European countries. Within the country, crude oil is transported by Ukrtransnafta, a joint-stock corporation, which has two subsidiaries af-

Fig. 58

MAJOR GAS AND OIL PIPELINES



filiated to the company, *Pridniprovskyi Oil-Trunk Pipelines* (Ukraine's southeastern region) and *Druzhba* (Friendship) Oil-Trunk Pipelines (with 740 km of domestic pipeline in the northwest: "*Southern Druzhba*"). During the last ten years, crude oil volumes transported by the pipeline system have ranged from 64 to 78 million tons, including the cross-country transit of 53 to 60 million tons. As a result, the Ukraine of today is not only an important country for the transit of gas, but is also a crude oil transport crossroads in Europe.

As is well known, the Caspian region these days appears to have the best prospects for growth in oil production. Currently there are multiple options for the delivery of Caspian crude oil to the world markets. The current route, via the Black Sea to the Mediterranean using the Bosporus and Dardanelles is limited due to the traffic capacity of the straits and environmental concerns. The *Odesa–Brody pipeline* is the only route for transporting Caspian oil to Central Europe – bypassing Russia and the Turkish straits – via the GUAM states: Azerbaijan, Georgia, Ukraine (through the Baku–Batumi–Odesa/Pivdennyi terminals). A plan was adopted in December 2002, regarding the extension of the Odesa–Brody pipeline to the Polish port of Gdańsk. The project's success would enable the sources of crude oil supply to be diversified, and enhance the reliability of the European oil transportation system. Northwestern Ukraine hosts part of the 'Southern Druzhba' oil pipeline, Russia's main overland crude oil export route. Ukraine also has the 'Pridniprovskyi' trunk pipeline which transports oil to southern Russia, as well as to several Ukrainian refineries. Ukraine's oil transit capacity now exceeds 2 million barrels per day.

In spite of copious domestic **natural gas** reserves, production in Ukraine is only 18–19 billion cubic meters (bcm) per year, which accounts for a quarter of the country's needs (77 bcm in 2005), and it is for this reason that approximately 75% of the gas consumed in Ukraine is imported from Russia and Turkmenistan. Gas accounts for about 43% of the overall national energy consumption. Ukraine is the main transit route for Russian natural gas exports to Europe (some 90%) and it has an extensive gas transmission system, which consists of 37,100 km of pipelines (designed in the Soviet era) and 72 compressor stations (112 compressor shops with a total capacity of 5,600 MW. The oldest ***gas transit pipelines***, built during the Soviet period, are the Brotherhood, Soyuz (Union) and Progress, which continue to supply the former allied Socialist (Comecon) countries of the USSR in Central and Southeastern Europe. The input capacity of the system is 290 billion cubic metres (bcm) a year, and the output stands at 175 bcm a year. Gas transit levels have been growing over the years, reaching 142 bcm in 2005. 13 underground gas storage facilities with a working capacity of over 34 bcm represent an important technological resource in Ukraine's gas transmission system. The *underground gas storage network* comprises of four systems: the West Ukrainian (Pre-Carpathian), Kyiv, Donets' and South Ukrainian. Connected by a network of pipelines, the facilities (particularly those in the western regions) ensure the reliable operation of the gas transmission system as a whole, and contribute to a stable gas supply to domestic consumers and for the transit of Russian gas to Europe.

The Ukrainian gas market is dominated by the state-owned holding company 'Naftohaz Ukrainy' responsible for the production, import, transport and distribution of natural gas. Along with subsidiaries dealing in oil products, other subsidiaries of Naftohaz are Ukrhazprom (production and transmission of gas) and Ukrhaz (sales). RosUkrEnergo (since 2004) as a subsidiary of Russian Gazprom (the state-controlled gas monopoly) supplies all gas imports from Russia and Central Asia to Ukraine.

Since the second half of the 1990s, the USA has pushed for the construction of several pipelines (e.g. TCGP: Trans Caspian Gas Pipeline, since 1996) that would carry Caspian energy westwards without have to transit Russia, and therefore break Russia's monopoly on the region's energy transportation system. Moscow moved fast to construct its own, 1,213 km long *Blue Stream* submarine gas pipeline (2001–2003) from Russia to Turkey, which killed the USA and EU-backed TCGP project **(***Figure 58***)**. At the same time, in concert with strong support from the USA, the *Southern Caucasus Pipeline* project (between Baku and Erzerum) was realised in 2006, allowing Azerbaijan and Georgia to resist Russian political and economic pressure. It was on this pipeline, together with the Baku–Supsa and Tbilisi–Yerevan–Tabriz gas pipelines that the Ukrainian *Supsa–Feodosiia* submarine *pipeline* was based, running between Georgia and

Ukraine (bypassing Russia), which can supply Caspian and Iranian gas to Ukraine and other European countries.

Since the "Orange Revolution" of 2005, the realigned, pro-Western (EU and NATO) attitudes of Ukrainian foreign policy have resulted in Russia increasing natural gas and crude oil prices to international market levels, for supplies destined for Ukraine. In January 2006 a gas-related crisis erupted between the two countries, following unsuccessful talks over gas prices, after which Naftohaz siphoned-off supplies from the main transit pipelines running via Ukraine, from Russia to Central and Western Europe. This resulted in the Russians shutting-down gas supplies. Indeed, this was not a unique reaction as Russia often closes off its supply to pipelines during times of political dispute (e.g. 2003 Latvia; 2006 Ukraine, Lithuania, Georgia and 2007 Azerbaijan), owing to the extremely close relationship between the Russian energy industry and the Kremlin.

Following the gas crisis, the EU has expressly endeavoured to decrease its strategic dependence on Russian (Gazprom's) gas (43% in 2005) and to diversify its energy supply (Hafner 2006). The first step in this direction is to realise alternative, non-Russian controlled gas corridors to the EU: the Nabucco and Turkey–Greece–Italy (TGI) pipelines, further diversifying export possibilities to European markets, bypassing Russia and Ukraine entirely. Construction of the 3,300 km long *Nabucco* pipeline is expected to begin in 2009 and completion is planned for 2012. It would connect Baumgarten an der March, the largest natural gas hub in Austria with Erzerum in Turkey, the end of South Caucasus Pipeline. Once completed, it will allow transportation of natural gas from producers in the Caspian region such as Azerbaijan, Turkmenistan and Iran to the EU and other countries along its path. The recently announced *TGI* pipeline would transfer Caspian gas from Turkey, through Greece to Italy, with an annual capacity of 11.5 bcm and a completion date of 2012 **(***Figure 58***)**.

These "southern corridors", together with the planned Supsa–Feodosiia pipeline are an example of strengthening Euro-Atlantic cooperation and could reduce the increasing Russian economic and political influence in given countries, of which Ukraine is one. As a result of the existing and planned "pro-Russian" and "pro-Western" energy corridors, Turkey has become a natural hub for Caspian and Iranian gas destined for Europe. But this strategic transit country, similarly to Ukraine, is increasingly dependent on Russian energy supplies (60% of natural gas and 20% of oil imports). Due to the Russian influence, Turkey has already demonstrated a cool attitude towards Ukraine's and Georgia's NATO aspirations and has openly opposed NATO's naval deployments in the Black Sea area (Tsereteli 2005).

Again, Russia is evidently trying to preempt these two pipelines (Nabucco and TGI) in order to preserve its European market dominance. Following Western opposition to Gazprom's involvement in Nabucco, in June 2007 Russia announced the *South Stream* project (a submarine pipeline running from Novorossiysk, Russia to Varna, Bulgaria), bypassing both the Caucasian countries and Ukraine.

Besides the above, in the frame of its anti-Nabucco campaign, in May-June 2007 Russia signed agreements with Kazakhstan, Turkmenistan and Uzbekistan (the main gas suppliers to the planned Nabucco), in order to construct new Russia-bound gas export pipelines, seriously damaging EU efforts for non-Russian controlled pipelines from the Caspian region. These plans, considered to be vital for Gazprom and Russia (among others) would establish a gas pipeline from Aleksandrov Gai, Russia (crossing Soyuz and the Central Asia – Centre Pipelines) to Novopskov, Ukraine in the same corridor as used by the Soyuz (1983) pipeline. With an annual 28 bcm capacity, this pipeline could serve as a link in the system through which gas is transported from Central Asia to Europe. The pipeline expansion between Uzhhorod and Novopskov would strengthen the role of Ukraine as a transit country for natural gas to Central and Western Europe.

Electricity. The second most significant actor in the energy sector is electricity generation. From the start of its development, electricity generation in Ukraine was focused on the consumption of indigenous organic fuels; later the emphasis was on nuclear power. As a result, these two branches have become the leading sectors. At the same time, potential reserves of alternative and renewable sources have the equivalent energy of 78 million tons of oil. In the field of alternative sources, wind power, biomass energy, the burning of gas (as a derivative of industrial waste) and pit gas (methane)

are the most important. As things stand today there is an urgent need to reconstruct the plants and their equipment, to replace obsolete technology used in the generation of electricity, and to facilitate the introduction of alternative and renewable energy sources.

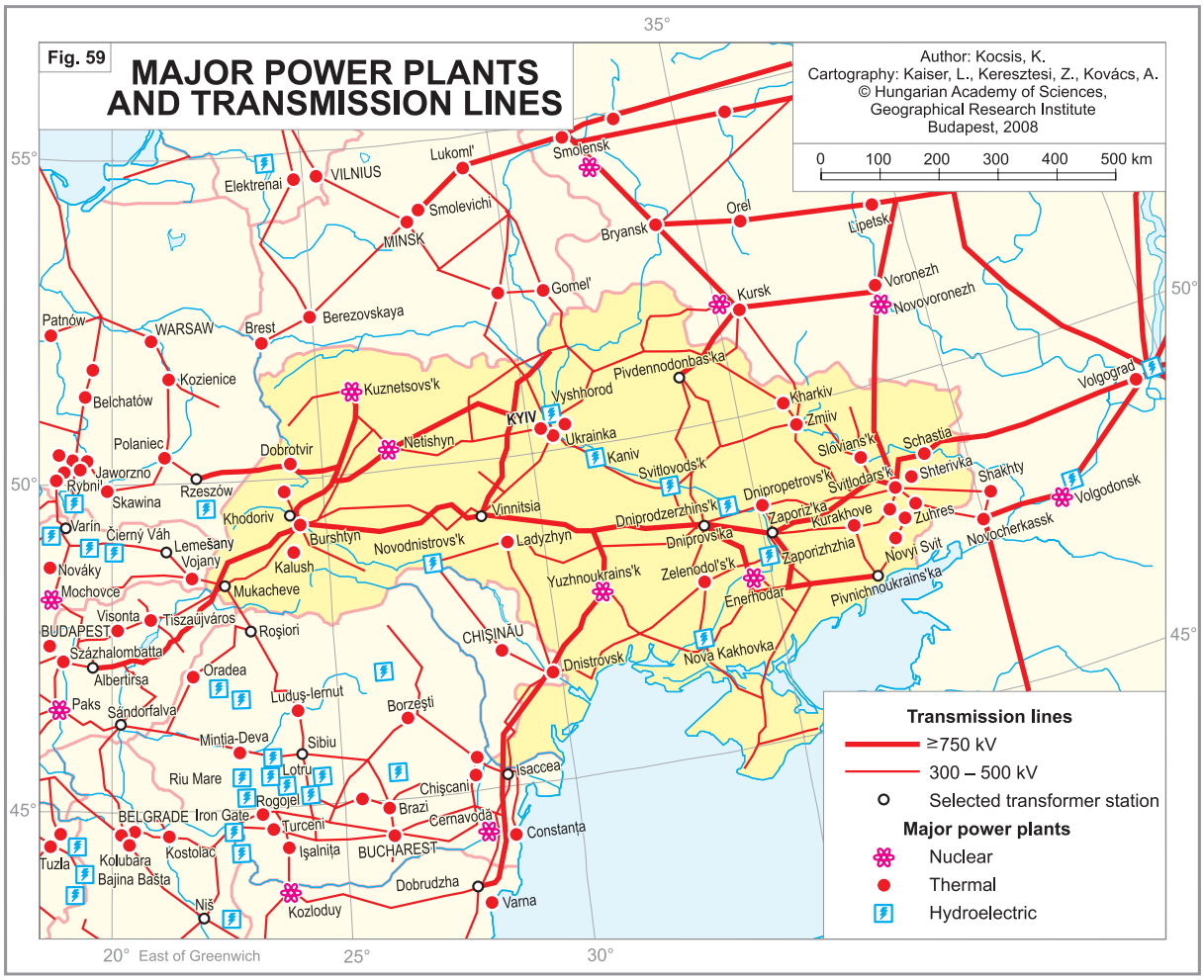
More than 11,000 ***power plants*** operate in Ukraine with a total capacity of 51,900 MW (2006), of which thermal power plants are responsible for the majority (64.3%), followed by nuclear power plants (26.6%) and finally hydroelectric power plants (9.1%). Ukraine's power generation output exceeded 185 billion kWh in 2005. Nearly 48% of this energy volume was produced by thermal power stations, an additional 45% by nuclear ones and the rest by hydroelectric plants. The country has 35 major thermal power stations with differing capacities, ranging from 0.3 to 5 million kW, 4 nuclear power plants with a total capacity of 14,000 MW and 5 hydroelectric power plants operating on the Dnister and Dnipro rivers. The larger power plants are concentrated in the industrial region of the Donets'k Basin and in the vicinity of Kyiv. Ukraine's energy consumption is around 176–182 billion kWh per year, which enables the country to export its surplus energy.

Ukrainian ***transmission lines*** (amounting to some 4,000 km with a capacity of over 750 KV) represented the most significant part of the "Yuzhny" (Southern) energy network of the former USSR. The first line was established in 1926 in the Donets' Basin (between the power plants Shterivka and Kadiivka/Stakhanov). In 1940, the energy networks of Donbas and Dnipro were united, followed by those of Kyiv, Dnipro, Kharkiv and Donbas in 1960. These Ukrainian power systems were connected to the Soviet "Volga" energy network in 1962, through the world's first 800 kV DC transmission line, between Donbas and Volgograd (*Figure 59*). The launch of the Mukachevo transformer station (400 kV) in 1963 served to facilitate the export of electricity to Czechoslovakia and Romania. From the second half of the 1970s, the installation of 750 kV lines towards Kursk and Novonoronezh served as the link to the Soviet "Central" (Moscow) energy network. After 750kV transmission lines were built between Donbas and Vinnytsia, during the 1970s and 1980s lines bearing the same capacity were constructed towards the nearby Comecon countries, which were grappling with energy insufficiency at the time. Namely, these countries were Hungary (to Albertirsa), Poland (to Rzeszów), Romania and Bulgaria (to Isaccea and Dobrudzha), and the export of electricity to these end-users was facilitated by the construction of numerous western Ukrainian large-capacity power plants (e.g. in Burshtyn, Kuznetsovs'k, Netishyn and Yuzhnoukrains'k).

The Ministry of Fuel and Energy is the top tier in the system regulating Ukraine's electrical energy networks. There are six power generation companies – 4 thermal ones and 2 state-owned hydropower companies – operating under its legislative control. State-owned Energoatom is responsible for the nuclear industry (including the 4 nuclear power stations) and the supply of nuclear fuel, security and nuclear waste disposal. State-run Energorynok is the operator of the Wholesale Electricity Market (WEM), based on the single-buyer model where prices for nuclear and hydropower generation are fixed by the government. UkrInterEnergo, also a state-owned company, exports electricity to Belarus, Hungary, Moldova, Poland, Romania and Slovakia. Ukrenergo is the company in control of the national grid, and is also the owner of cross-border lines. 27 local electricity companies are in control of distribution, under a TPA (Third Party Access) regime. The sector has been partially privatised with US-based AES and Slovakia's VEZ as foreign investors. Other independent electricity suppliers hold licenses to supply electricity at non-regulated tariffs. Large industrial consumers can acquire delivery licenses and purchase their own supply of electricity at non-regulated prices.

The network used for the transmission and distribution of electricity, which consists of 17,000 km of high-voltage transmission lines inherited from the Soviet Union, is inefficient and antiquated, resulting in significant wastage due to line losses. In 2000, Russia and Ukraine struck a deal to reconnect their energy grids, providing Ukraine with a more stable electricity frequency and enabling Russia to export its own electricity to other countries, including Moldova, Bulgaria, Romania and other Balkan states, via Ukraine.

The fact that many ***thermal power plants*** in Ukraine are old with antiquated equipment is a serious challenge. Obsolete technology and the lack of modern equipment (e.g. filters on smokestacks) have led to increasing pollution. There are efforts to raise efficiency and safety



of old thermal power plants, but these plans have been delayed due to financial difficulties and legislation gaps. Thermal power stations are to be found all over the country, but they reach a particularly high density in the traditionally industrial regions, such as Donbas, the belt along the Dnipro river, Ciscarpathia, and hubs like Kyiv, Kharkiv and L'viv. Thermal power plants in Burshtyn, Zelenodol's'k (Kryvoriz'ka), Dnipropetrovs'k (Pridniprovs'ka), Novyi Svit (Starobeshivs'ka), Schastia (Luhans'ka) and Zmiiv are in need of capital injections for their refurbishment.

Hydroelectric power – as a renewable energy source – only plays a modest role in Ukraine's total energy output. The average annual output of hydroelectric power in Ukraine amounts to 10.1 TWh, which meets 7% of consumption demand on electricity. The total installed capacity is 4.4 GW. Of the existing hydroelectric power plants (65) there are 8 large ones (between 350 and 1450 MW of installed capacity), e.g., Dniprohes-2 (Zaporizhzhia), Kremenchuks'ka (Svitlovods'k), Kyivs'ka HES, HAES (Vyshhorod) and Dnistrovs'ka (Novodnistrovs'k). Dniprohes in Zaporizhzhia, the largest Ukrainian hydroelectric power plant (built 1927–1932 and rebuilt 1944–1949) was one of the first significant achievements of Soviet industrialisation.

The economically feasible hydropower capacity of Ukraine is estimated to be 17 TW per annum for large and 3.7 TW for smaller hydroelectric power plants. According to the EBRD (European Bank for Reconstruction and Development) around 26% of resources have been exploited up until now. The majority of resources are concentrated in Central and Western Ukraine on the Dnipro, Dnister, Southern Buh and Tisa rivers.

Nuclear power has a great significance in the energy management of Ukraine since it is responsible for over 45% of electricity generated. It is produced by 15 nuclear reactors, all of the VVER type in 4 nuclear power plants: Zaporiz'ka in Enerhodar (6 reactors with

6,000 MW gross capacity), South Ukrainian in Yuzhnoukrains'k (3 reactors with 3,000 MW gross capacity), Rivnens'ka in Kuznetsovs'k (4 reactors with total 2,840 MW gross capacity) and Khmel'nyts'ka in Netishyn (2 reactors with 2,000 MW gross capacity, and an additional 2 under construction). There are plans to build new nuclear power plants in a few years time, to compensate for those reactors that were damaged and shut down in Chernobyl, in 1986 and 2000 respectively. Zaporiz'ka (built 1985–1995) is the largest nuclear power plant in Europe and the third largest in the world. It generates about half the Ukrainian electricity derived from nuclear power. For the time being Ukraine does not produce nuclear fuel of its own, though the country has resources of radioactive raw materials. Thus, uranium ore is being extracted in Central Ukraine at sites in Zhovti Vody, Vatutine, Michurins'k and Novokostiantynivs'k. There are some prospects for the establishment of a nuclear fuel production facility in Ukraine.

The exploitation of ***alternative resources*** for power generation is expanding. In the Autonomous Republic of Crimea and some southern oblasts (Odesa, Mykolaiv) *wind farms* are operating. These regions are also suitable for the development of solar power generation.

Agriculture

Ukraine has a favourable natural environment for the development of farming, which has been the traditional occupation of the rural population since ancient times. The percentage of land that is classed as agriculturally productive is well above the European average. 86% of the country's territory or 56 million hectares (representing 15.8% of Europe's productive land area, excluding Russia) is potentially cultivable. This remarkable potential for farming is due to the frequent occurrence of loess covered plains and uplands, and the high fertility soils that have developed upon them. High quality chernozems are found over three quarters of Ukraine, which is the highest percentage for any country on Earth. With respect to the area of potentially cultivable land, measured per capita (0.67 hectares/person) Ukraine is second to none in Europe. It is for these reasons that the foreign trade balance has been continually positive with the exception of the 1992–1993 growing season.

Presently, the **agricultural potential** of the country is insufficiently utilised due to inferior technology and poor economic conditions. Further progress in the farming sector is also being curbed by a series of unresolved issues relating to land reform, the lack of financial and technological support for agriculture, disparities between prices for industrial commodities and farming produce, and slow social progress in rural settlements. All these have led to a depreciation of fixed assets, decline in production volumes and to the decrease in the productivity of labour (*Figures 60 and 61*).

Fig. 60

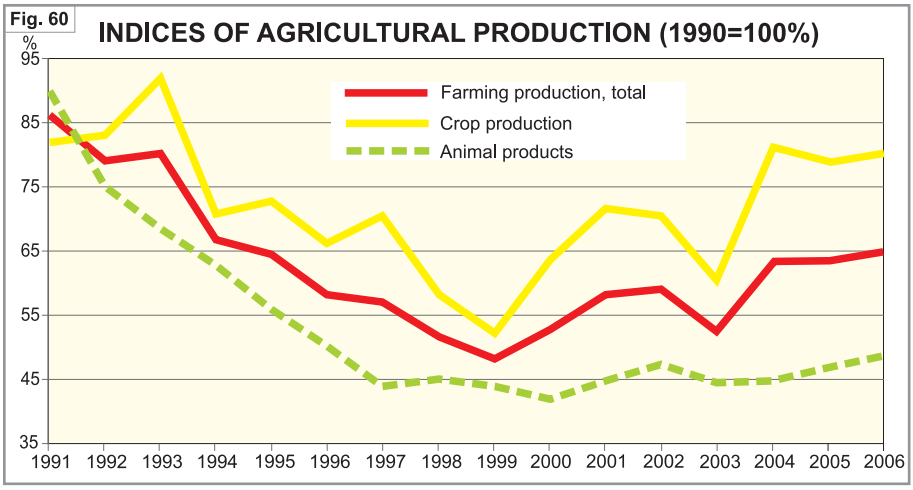
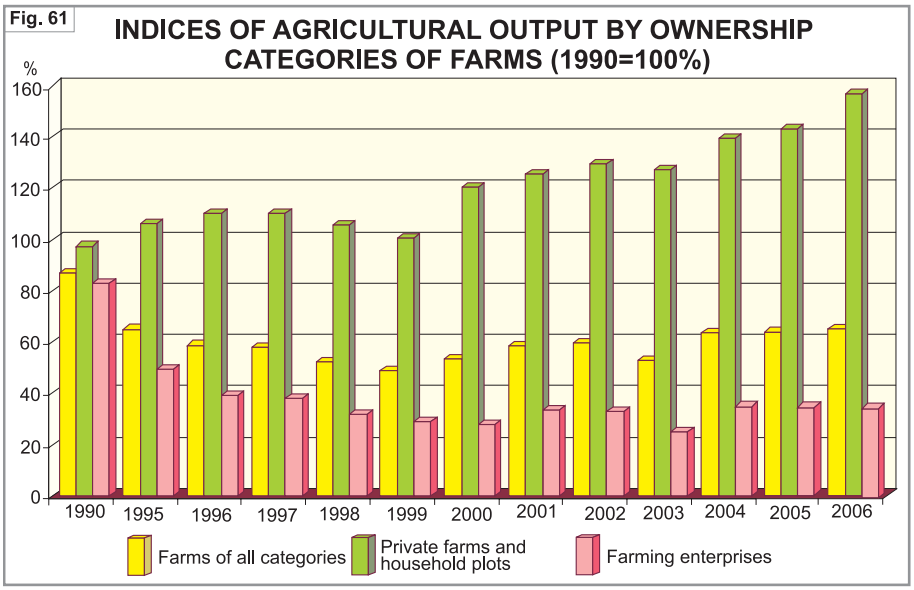


Fig. 61



Agricultural output fell dramatically in Ukraine during the period between gaining independence and 1999. The latter year represented a turning point, yet farming production, even in 2006, reached a mere 65% of the level in 1990. The crop cultivation sector suffered a lesser decline (reaching 80.2% of 1990 levels by 2006), compared to that of animal breeding (49.2%). The 1990s saw crop cultivation expand at the expense of animal husbandry,

owing to the fact that natural conditions proved to be more favourable for the former agricultural sector. The share of crop cultivation passed the 50% threshold in 1992, and continued to rise in a prolonged trend, with values over 60% by the 2000s (*Table 16*). Since 2003, animal breeding has ensured the further expansion of farming, showing a slight growth within that branch.

the arable land hosts low efficiency enterprises extending over 1000 ha. They produce ca. 35% of the agricultural output. There has been a sharp decline in the share of large enterprises in animal husbandry, from 70% of meat production in 1990 down to 30% at present.

In contrast, most enterprises operate on *holdings* of less than 50 ha, even though they

Table 16. ***Dynamics of the structure of agricultural production between 1990–2004 (in adjusted prices, % of 2000)***

	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Agricultural production	100	100	100	100	100	100	100	100	100	100	100
Output of crop cultivation	**50.1**	**56.7**	**57.0**	**61.6**	**56.4**	**54.3**	**60.4**	**61.6**	**59.9**	**57.7**	**64.3**
Cereals	21.2	20.9	17.4	25.3	21.1	20.6	19.5	28.3	27.2	16.4	27.7
Industrial crops	7.3	7.7	6.7	5.9	5.7	6.5	6.6	5.5	6.0	7.5	6.2
Potatoes, vegetables and melons	10.5	16.6	21.2	19.5	21.3	19.9	25.5	21.3	20.4	25.3	23.3
Fruits, berries and grapes	3.8	3.7	4.6	5.4	3.0	2.5	4.2	3.0	3.1	4.7	3.9
Fodder crops	6.6	5.8	5.2	5.4	4.7	4.0	3.6	3.3	2.9	3.1	2.6
Other products and changes in incomplete production	0.7	1.9	1.9	0.1	0.6	0.8	0.9	0.2	0.2	0.6	0.5
Output of livestock breeding	**49.9**	**43.3**	**43.0**	**38.4**	**43.5**	**45.6**	**39.6**	**38.4**	**40.1**	**42.3**	**35.7**
Livestock and poultry	29.0	21.3	20.8	18.2	21.3	22.2	19.2	18.6	19.3	19.4	16.2
Milk	15.4	16.8	17.0	15.1	16.7	17.4	15.0	14.5	15.0	16.4	13.8
Eggs	3.7	3.3	3.4	3.3	3.6	4.1	3.8	3.8	4.1	5.0	4.3
Other products	1.8	1.8	1.8	1.8	1.9	1.9	1.6	1.5	1.4	1.5	1.4

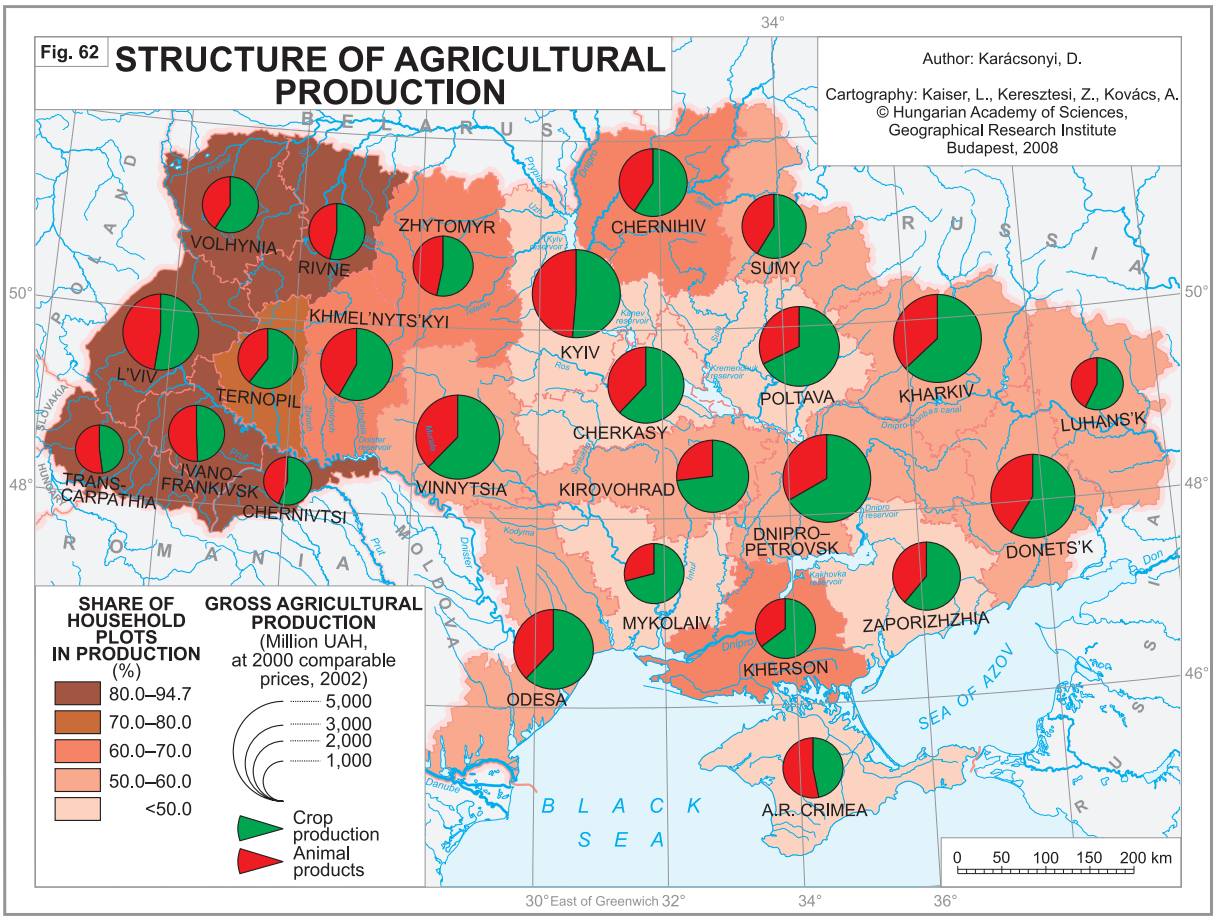
Source: Ukraine in Figures 2004

In spite of the shift towards crop cultivation, the area of ploughland (33.4 million hectares in 1990) had shrunk by ca. 2.2 million hectares by 2003, i.e. by almost one tenth. The drop in yields can be explained primarily by adverse technological standards and poor economic conditions.

Nowadays much less fertiliser is applied, i.e. ca. 20 kg per hectare vs. 141 kg in 1990. Reduction in the number of livestock has caused less manure to be spread over fields: 8 tons per hectare in 1990 compared to just over one ton presently. Farming technology, including machinery has grown obsolete. During this period the number of tractors dropped to 60% of original numbers (80 ha of ploughland per tractor in the early 1990s, compared to 140 ha. in 2002), whilst that of combine harvesters halved.

Farming enterprises grouped by the size of their agricultural land show a similar pattern as witnessed in previous times and extremes are characteristic. Farms of optimum size (100–500 ha) occupy only 7% of cropland, whilst 80% of are responsible for 60% of agricultural production, on only 3–4% of the total crop area. Within the sphere of *private farms,* Ukrainian statistics distinguish between farms (over 2 ha of land area) and household plots (up to 2 ha). The latter number more than six million, with an average size of one hectare. Farming that is labour intensive is typical of these types of smallholding. These farms and household plots produce 67.8% of meat, 81.6% of milk, and 53.7% of eggs.

In the west of the country, private farming on small plots dominates, providing over half of agricultural output in the environs of Kyiv and in Crimea, although elsewhere its share is less. Large-scale production plays a subordinate role in areas notable for private farming. Moreover, private sector farming is relatively significant in Donbas (auxiliary farms) and in Kherson oblast (intensive horticulture). Animal breeding has achieved prominence in areas that have unfavourable conditions for crop cultivation, e.g. in the Carpathians and some parts of the arid steppe (*Figure 62*).



Crop production. Cereals, sugar beet and sunflowers are the three types of crop fundamental for Ukrainian agriculture, being not only the principal source of domestic food supply but also the main products underpinning the export effort in the domestic agrifood economy. As regards crop production, Ukraine is a leading country and a key player on the world market, but it has been giving away its market share of late. Sugar beet has been the primary loser, but the output of grain crops has fallen as well (*Table 17*).

The extension of ***agricultural territory*** reaches the highest percentage in the forest steppe and steppe areas, i.e. in the south-east of the country, and the smallest in the Carpathians and Polissia (*Figure 63*). The *sown area* totalled 25.9 million ha in 2006; the past 16 years has witnessed a structural rearrangement of the basic crops grown on this land. The percentage of the sown area bearing cereals and leguminous crops has increased from 45% to 56%, and from 6.4% to 7.8% for land bearing potatoes, vegetables and melons. For industrial crops the increase has been from 11.6% to 23.6%, whereas the ratio of land cultivating fodder crops dropped from 37.0% to 12.6%. Cereals occupy half of the sown area; in the west fodder crops and vegetables prevail whilst in the east industrial crops dominate.

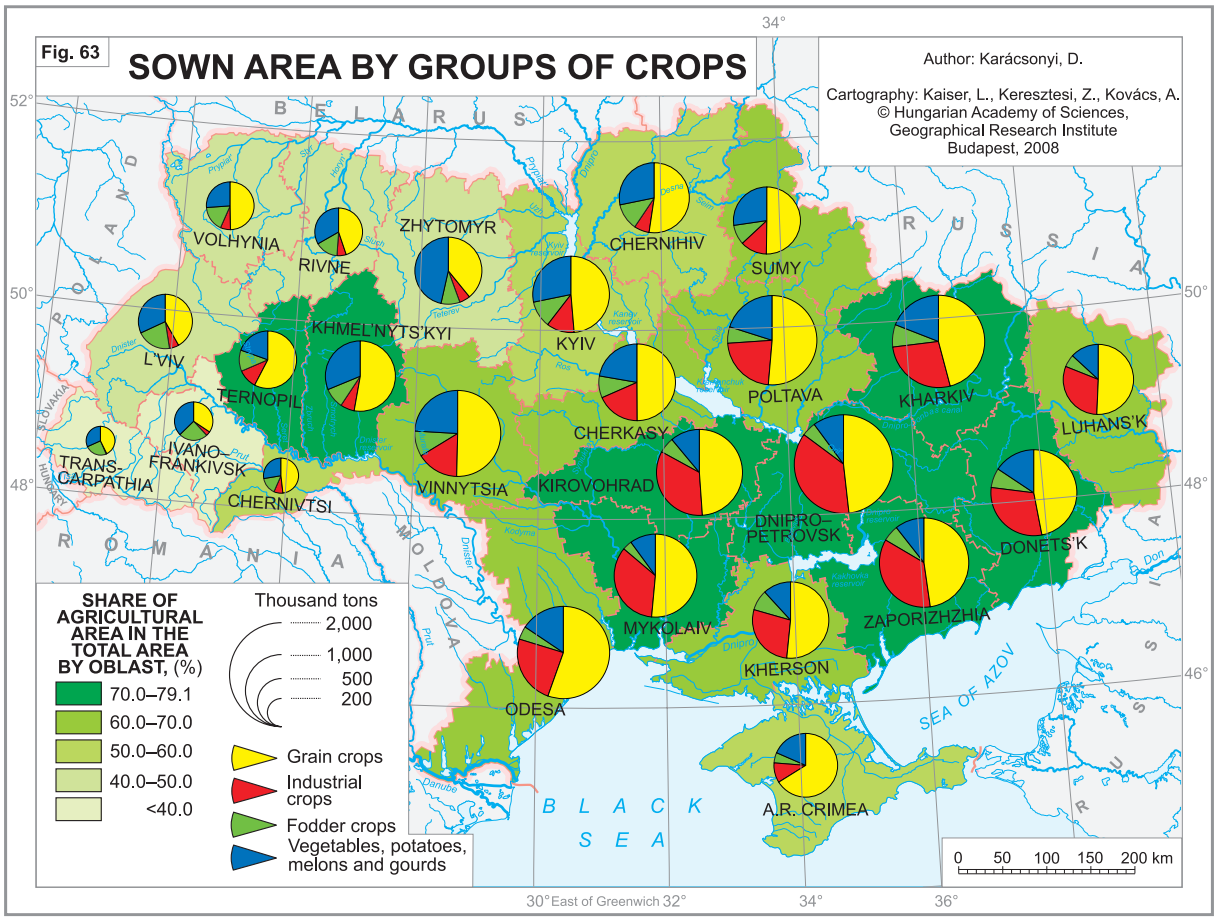
Table 17. ***Global output of selected crops: Ukraine's ranking***

	1992–1994	2004–2006
Wheat	7.	11.
Sunflower seed	4.	2.
Sugar beet	2.	5.
Potatoes	4.	4.

Source: www.fao.org

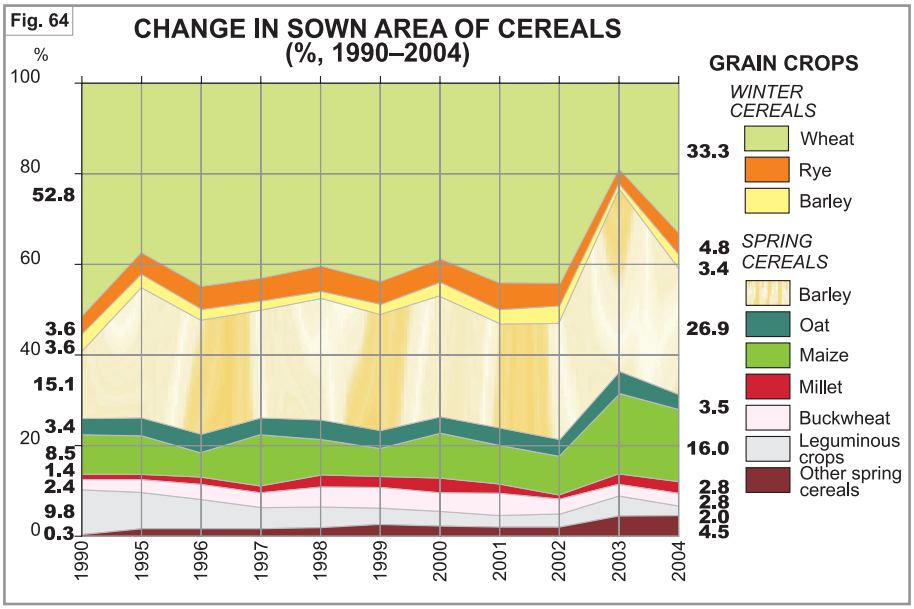
Cereal production in Ukraine traditionally belongs to a sphere of strategic priority for farming development, and in the national economy in general. Over a long historical period, cereals have occupied over half the arable land, and by output of grain per capita Ukraine has always been among the leading 6–7 countries of the world.

From 1990 to 2006 there has been a sore lack of state support for cereal production, which



had led to a drop in output (from 51.0 million tons in 1990 to 34.2 million tons in 2006). Structural changes have seriously affected the extension of the sown area and the output of grain crops. Winter cereals have reduced, whilst grain crops with lower ecological requirements (e.g. spring wheat) have spread (*Figure 64*). Yields of grain crops as a whole have shown a downward trend, from 3.51 tons per hectare to 2.83 t/ha. 2001 was a turning point, where the seeds of recovery from a crisis situation were sown in this key agricultural sector, with its harvest of 39.7 million tons of grain. The threshold of 40 million tons allows the state to fully meet its consumption requirements, to establish seed reserves and provide a firm basis for stall and pasture feeding to support animal husbandry.

Although the sown area of ***industrial crops*** has expanded considerably (from 3.8 to 5.0 million ha), output has experienced a 2.6-fold



shrinkage over the same period. There has been a marked realignment in the sown area of the two basic industrial crops, i.e. sugar beet and sunflower. From 1991 onwards, the land bearing the following crops has experienced considerable shrinkage within the total sown area for industrial crops: long-stalked flax – from 4.6% to 0.8%, sugar beet – from 42.8% to 15.1% and hemp – from 0.3% to 0.1%. At the same time, land bearing sunflower has increased dramatically from 43.6% to 70.8% (*Figure 65*).

Sugar beet. Ukraine is a country with a long tradition of sugar production. Due to favourable soil and climatic conditions, along with highly productive technology the country has been among the leading national exporters in Europe, even if most of the latter produce sugar from sugar cane. Growth in production lasted for 30 years (1960–1990), but this success has vanished over the recent past (1991–2006) owing to significant shrinkage in the sown area (from 1,607,000 ha to 815,000 ha). During this period there had been a drop in the total output (from 29.6 to 22.4 million tons), a 6–8-fold decrease in the use of mineral fertilisers. 3–4 times less manure was used, and the purchase of technical equipment decreased 14-fold. The branch has also been adversely affected by an economic crisis arising from the transition into an unregulated market economy and hit by a massive privatisation of the sugar industry. Overcoming this situation and a revival of the sugar industry on the basis of increasing its competitiveness on the world market has become a national challenge, although most agrarian economists do not consider sugar beet cultivation to be an agricultural branch with rich prospects for the future.

The share of *sunflower* more than doubled within the sown area, its total annual output rising from 2.6 m to 5.3 m tons from 1990 until 2006. Over the same period yields dropped from 1.58 to 1.36 t/ha, therefore an eminent, current task is the application of sophisticated technologies in order to achieve higher yields for this industrial crop.

In 2004, 16,000 tons of *long-stalked flax* was produced in comparison to 108,000 tons in 1991. Over the same period, the sown area had fallen from 172,000 ha to 38,000 ha, and yields (fibre) dropped from 0.64 to 0.5 t/ha.

Potatoes. Ukraine is one of the leading nations in the output of this crop, second only to Russia among the successor states of the USSR. Potatoes account for 24% of all farming activities in 2004 (at adjusted prices). The planted area was 1,464 thousand ha, and the total output amounted to 19.47 million tons (2006).

Vegetables. During the 1990–2006 period, total vegetable output rose from 6,666 thousand to 8,058 thousand tons with a concomitant growth in the planted area by 127,000 ha, whereas yields remained unchanged.

Production of individual crops is concentrated in various regions of the country. Cereals and sunflowers are typically grown in the south-east, potatoes are dominant in the north-west, and sugar beet is predominant in the central part of Ukraine (*Figure 66*).

Animal husbandry. The fundamental difference in comparison to the earlier Soviet period is that fodder grain was produced in insufficient quantities to feed the animal stock and had to be imported; nowadays meat itself is imported so the stock has been correspondingly reduced. Consequently, less fodder is needed and grown at present.

Within the gross output of the farming sector, livestock, poultry and animal products were

Fig. 65

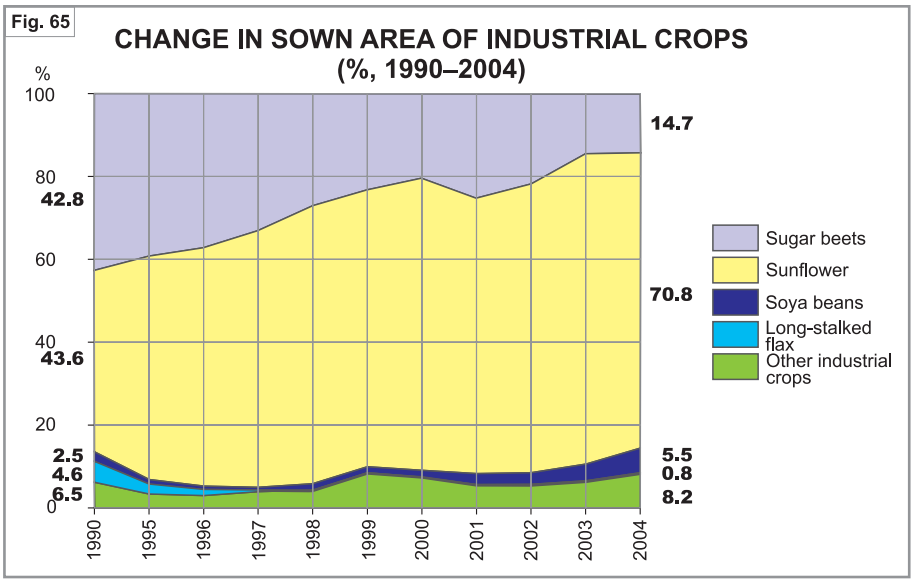
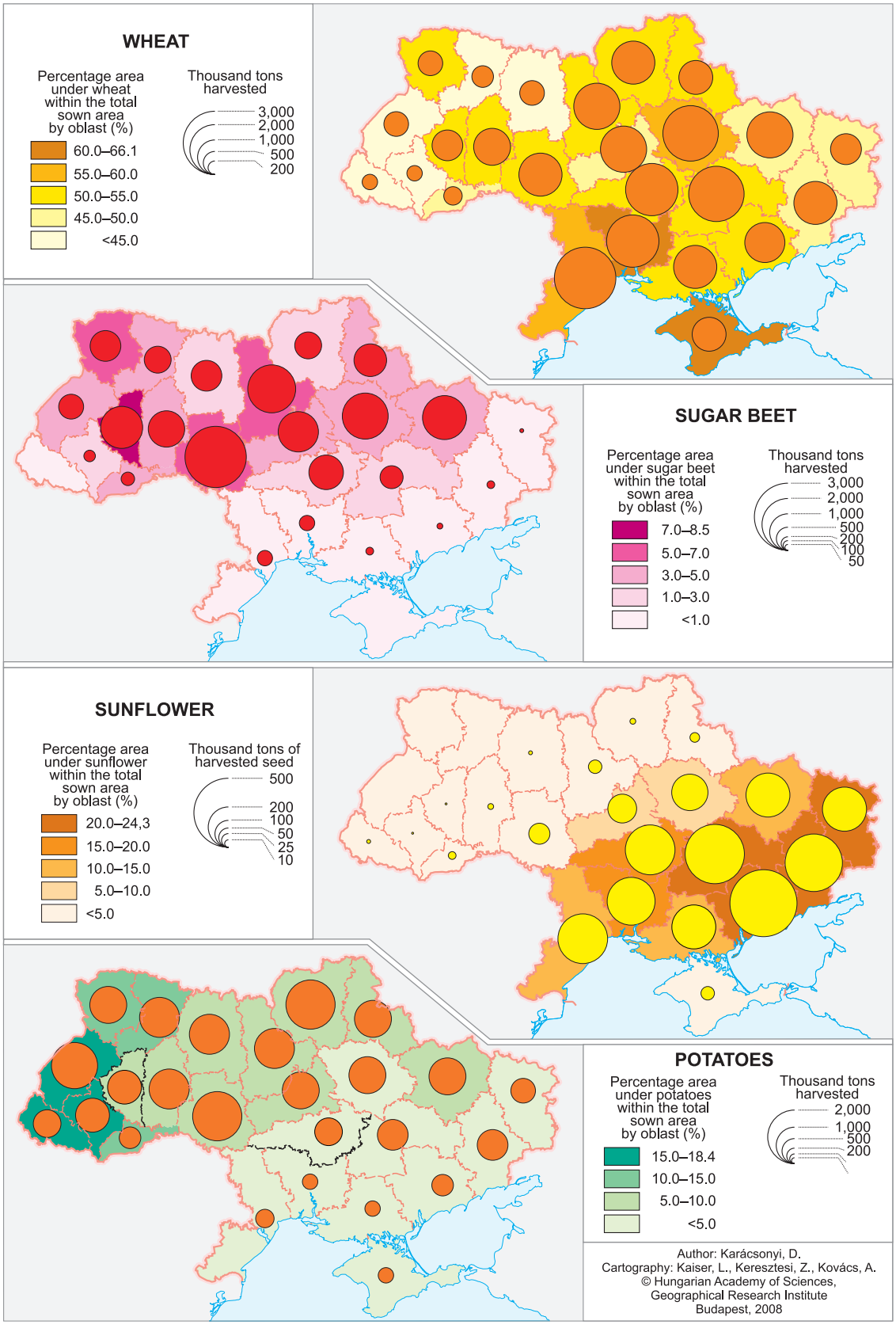


Fig. 66

OUTPUT OF MAJOR CROPS (2002)



Author: Karácsonyi, D.
Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.

Geographical Research Institute
Budapest, 2008

responsible for 38% in 2006. The current cattle stock is today a quarter of 1990 levels, although numbers of cows have been less heavily reduced (to 40% in 2007), indicating the importance of the dairy industry. Stocks of hog and poultry have, of late, shown a slow growth relative to other domestic animals, although the former has reached a mere 40% of the 1990 volume. A minimum decline has affected poultry stocks (*Figure 67*).

Meat production. In 2006, 1,723 thousand tons of meat of all kinds was produced on the farms across Ukraine. Its distribution was in the following manner: beef and veal – 32.9%, pork – 30.5%, poultry meat – 34.2%, mutton and lamb – 0.9%, rabbit meat – 0.8%, horse meat – 0.8%. The years between 2002 and 2004 saw a stable trend of growth in meat production and consumption, with the latter eventually reaching 34.5 kg per capita.

Milk production. Over the past years – due to objective and subjective reasons – dairy farming in large scale units of production has suffered from adverse changes, which has led to similar shifts in the output of the dairy industry, a weakening provision of milk and dairy products from dairies themselves, and to the fall in overall consumption by the population. At present there is a slow recovery in numbers of dairy cattle on farms of various types; milk production from these farms represent a mere 0.6% of total milk output. Between 1990 and 2006, the number of cows in private farms had grown by 0.8 million (37.4%) and milk production increased by 6.3 million tons (105%). However this growth in the production capacity of small farms could not compensate for the decline in large-scale enterprises. The consumption of milk and dairy produce continued to decrease in 2004, by which stage it was 226 kg per capita (in milk equivalent).

Under the present circumstances, in order that cattle breeding be developed, certain measures have been taken to stabilise the numbers of dairy cows and prevent a further reduction of stock, with a concomitant and intense growth in its productivity. In order to solve problems preventing the revitalisation of dairy stock and further develop breeding, it will be necessary to change the fodder structure, standards of feeding should be raised and the quality of fodder improved.

Poultry. The share of poultry farming within the gross output of agriculture is around 6%, and within animal breeding it reaches 15%. This branch provides 23.5% of the gross volume of meat produced. An overwhelming share (76%) of poultry stock is concentrated in private farms.

Due to the large territory of the country, differing zones have a profound influence on the spatial pattern of agricultural production. Regions largely follow climatic and soil characteristics, i.e. agroclimatic zones. Additionally, production intensive raions have formed around the urban centres, catering for the supply of these towns and cities. In Crimea, subtropical climatic conditions have shaped specific farming regions, whereas in the Carpathians, vertical zonality is responsible for the differentiation of agricultural production. There are seven large agricultural regions on the territory of Ukraine. The forest zone is dominated by animal husbandry (breeding dairy cattle), whereas in the forest steppe crop production prevails (wheat, sugar beet, and further south, maize). Livestock and poultry breeding is much more limited in the steppe zone (*Figure 68*).

Fig. 67

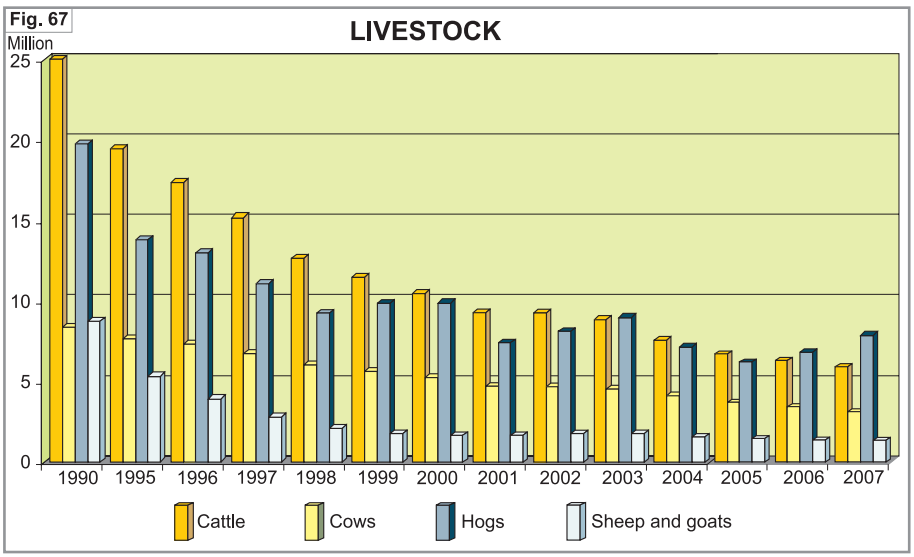


Fig. 68

AGRICULTURAL REGIONS

TYPES OF AGRICULTURAL REGIONS

I. Animal breeding of intensive type

1. Beef and dairy stock, flax, potatoes
2. Beef and dairy stock, sugar beet, flax, potatoes
3. Beef and dairy stock, flax

II. Intensive crop cultivation and animal breeding

4. Grain crops, sugar beet, beef and dairy stock, hogs
5. Grain crops, sugar beet, fruits, beef and dairy stock
6. Grain crops, sugar beet, fruits, beef and dairy stock, hogs

III. Crop cultivation and animal breeding

7. Grain crops, sunflower, beef and dairy stock, hogs
8. Grain crops, grapes and fruits, vegetables, beef and dairy stock, hogs, sheep, poultry

IV. Crop production specialising in fruits, grapes, perennial non-foods, and vegetables

9. Grapes, fruits, vegetables, beef and dairy stock, poultry
10. Grapes, fruits, tobacco

V. Livestock breeding on the mountain pastures

11. Beef and dairy stock
12. Beef and dairy stock, sheep, subsidiary holdings

VI. Crop cultivation and livestock breeding

13. Grapes, fruits, tobacco, vegetables, grain crops, beef and dairy stock, sheep

VII. Highly intensive agriculture around large cities and in urban agglomerations

14. Highly intensive suburban vegetable growing, dairying and poultry raising, grain crops, fruits and berries

Transport and Telecommunication

The geographical location of Ukraine from a transport perspective is highly favourable, even though this advantage has been insufficiently used thus far. The efficient operation of the domestic transport system and its connection to the European and global network is of key importance for the performance of a series of contemporary tasks and would allow an expansion of international traffic volumes. The share of enterprises operating in the road and transportation sector account for 6.9% of GDP, and the aggregate value of their fixed assets amounts to 13.4% of the total productive potential of Ukraine.

The country's general transport network includes 43,500 km of main pipelines, 22,100 km of railways, 164,600 km of paved public roads, and 2,200 km of navigable waterways with an exit to the Sea of Azov and the Black Sea (*Figure 69*). The volume and turnover in the transportation of both passengers and goods are shown in *Tables 18* and *19*.

In 2004, the volume of freight traffic amounted to more than 1.7 billion tons and turnover was over 480 billion ton kms. The highest share within freight was carried by road (59%), followed by rail (27%) and pipeline (13%). Waterways played a negligible part in freight traffic (1%).

Road transport is the most important branch of both freight and passenger (46.5%) traffic. Due to the country's predominantly plain-like topography, the network of public roads displays a uniform pattern over most of its territory. Toward the west their density is somewhat higher. Average density of paved public roads is 273 km per 1000 km^2. The most important arterial roads are: Kyiv–Zhytomyr–Rivne–L'viv; Kyiv–Poltava–Kharkiv–Debaltseve; Kyiv–Uman'–Odesa; Kyiv–Khlukhiv; L'viv–Mukacheve; and Kharkiv–Novomoskovs'k–Zaporizhzhia–Simferopol' (*Figure 70*). The largest road hubs are Kyiv, L'viv, Kharkiv and Khmel'nyts'kyi. Road transport dominates interurban and suburban passenger traffic. With respect to freight traffic, containers and refrigerator lorries are the primary means of transport.

Rail transport ranks second in volume for both freight and passenger traffic (27% and 5.6% respectively). It is important in domestic transport and particularly important in international transport. The railway density is 36 km per 1,000 km^2 reaching a maximum in the south-east (Donbas) and in the western part of the country. The most important trunk railway lines are: Kyiv–Fastiv–Koziatyn–Zdolbuniv–L'viv; Koziatyn–Zhmerynka–Odesa; Kyiv–Konotop–

Table 18. ***Volume of passenger and freight traffic by type***

Types of transport	Passenger traffic				Freight traffic			
	1990		2004		1990		2004	
	m. pass.	%	m. pass.	%	m. tons	%	m. tons	%
Transport, total	14,977	100	7,997	100	**6,286**	100	**1,731**	**100**
Land	14,917	99.6	7,982	99.8	6,167	98	1,710	99
Rail	669	4.5	452	5.6	974	15	462	27
Motor vehicle	8,331	56.0	3,720	46.5	4,897	78	1,027	59
Tram	2,007	13.4	1,112	13.9				
Trolleybus	3,232	21.5	1,849	23.1				
Metro	678	4.5	848	10.6				
Pipeline					296	5	221	13
Water	45	0.3	12	0.2	119	2	21	1
Sea	26	0.2	10	0.1	53	1	9	0
River	19	0.1	2	0	66	1	12	1
Air	15	0.1	3	0	0.2	0	0.1	0

Source: Statystychnyi schorichnyk Ukrainy za 2004 rik, Vyd. Konsul'tant, 2005.

Fig. 69

TRANSPORT NETWORK

Railway lines
- Multi-track
- Double-track
- Single-track
- Narrow-gauge
- Electrified

Highways
- Arterial
- Regional
- Other

- Seaports and river ports
- Airports
- Sea routes and distances in kilometers
- Sea ferries (car and railway)
- Navigable sections of rivers

Main pipelines
- Oil
- Gas
- Oil product
- Oil and gas fields
- Main traffic nodes and stations

Density of railways of general use
(km/1000 sq. km)

16–28	40–50
28–32	50–60
32–40	


Author: Razov, V., Kas'ianova, N.
Cartography: Yevronina, I.
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Kyiv, 2008
Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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Budapest, 2008
RUSSIA
from Bryansk
from Kursk
from Michurinsk
from Ostrogorsk
from Jelec
from Petrovsk
from Urengoy
from Orenburg
from Samara
to Kamensk Shakhtinskiy
to Tichoretsk
to Aksaj
to Taganrog
from Taganrog
Seredina-Buda
Druzhba
Shostka
Hlukhiv
Krolevets
CHERNIHIV
KURSK
VORONEZH
Bakhmach
Konotop
Vorozhba
Nizhyn
SUMY
Romny
Lebedyn
BELGOROD
Priluchke
Pryluky
Okhyrka
Lopan'
Yahotyn
Chervonozavods'ke
Pyriatyn
Bohodukhiv
Buhruvatyvske
KHARKIV
Hrebinka
Lubny
Myrhorod
Liubotin
Merefa
Kup'ians'k
Novopskov
Kaniv
Khorol
POLTAVA
Zolotonosha
Karlivka
"Soyuz"
Shebelinske
Svatove
Starobils'k
Milove
Korsun'
CHERKASY
Horodyshche
Krasnohrad
Izium
Smila
Kam'ianka
Butenky
Krasnyi Liman
Kremenchuk
Komsomol's'k
Pereschepyne
Lozova
Slov'ians'k
Lysychans'k
Svitlovods'k
Artemivs'k
LUHANS'K
Znam'ianka
Oleksandriia
Novomoskovs'k
Pavlohrad
Krasnoarmiis'k
Horlivka
Debal'tseve
Krasnodon
KIROVOHRAD
Dniprodzerzhyns'k
P'iatykhatky
DNIPROPETROVS'K
Synel'nykove
Yasynuvata
Antratsyt
Sverdlovs'k
Novoukrainka
Pomichna
Chaplyne
Dolyns'ka
DONET'S'K
Ilovais'k
Bobrynets'
Kryvyi Rih
ZAPORIZHZHIA
Volnovakha
Novyi Buh
Nikopol'
Polohy
ROSTOV-NA-DONU
Voznesens'k
Vasylivka
Tokmak
Dniprorudne
Mariupol'
Snihurivka
Fedorivka
Vesele
Melitopol'
Berdians'k
MYKOLAIV
Oktiabrsk
Kakhovka
KHERSON
Ochakiv
Nova Kakhovka
Dnipro-Buz'kyi
Partyzany
Heniches'k
Skadovs'k
Krasnoperekops'k
Strilkove
Holichinske
Dzhankoi
Chornomors'ke
Kerch
Stormove
Evpatoriia
Hvardiis'ke
Vladyslavivka
Feodosiia
SIMFEROPOL'
Alushta
SEVASTOPOL'
Yalta
SEA OF AZOV
Gulf of Taganrog
Ukraine.
Passenger traffic by means of transport
(%, 2003)
7712 million persons
0.09
6.18
0.03
24.91
42.76
14.68
11.32
0.03
Rail
River
Trolleybus
Tram
Metro
Air
Road
Sea
Ukraine.
Cargo traffic by means of transport
(%, 2003)
1655 million tons
0.54
13.10
0.01
26.93
0.60
58.83
Rail
River
Road
Air
Pipeline
Sea
SCALE 1:4 000 000
0
50
100
150
200 km

Table 19. ***Turnover of passengers and freight traffic by type***

Types of transport	Passenger turnover				Freight turnover			
	1990		2004		1990		2004	
	billion pass. kms	%	billion pass. kms	%	billion ton kms	%	billion ton kms	%
Transport, total	**222.5**	100	**128.6**	100	**1,039.3**	100	**480.1**	**100**
Land	204.7	92	123.0	96	761.7	74	464.9	97
Rail	76.0	34	51.7	40	474.0	46	234.0	49
Motor vehicles (buses)	90.3	41	46.5	37	79.7	8	28.8	6
Tram	13.0	6	6.6	5				
Trolleybus	21.0	9	10.8	8				
Metro	4.4	2	6.4	5				
Pipeline					208.0	20	202.1	42
Water	1.7	1	0.1	0	277.5	26	14.9	3
Sea	1.1	1	0.1	0	265.6	25	9.3	2
River	0.6	0	0.0	0	11.9	1	5.6	1
Air	16.1	7	5.5	4	0.1	0	0.3	0.1

Source: Statystychnyi schorichnyk Ukrainy za 2004 rik, Vyd. Konsul'tant, 2005.

Shostka; Kyiv–Poltava–Kharkiv–Debaltseve; Fastiv–Smila–Dnipropetrovs'k–Donets'k; Kharkiv–Dnipropetrovs'k–Zaporizhzhia–Simferopol'–Sevastopol'; and L'viv–Mukacheve–Chop. Railway hubs with developed railway station networks are Kyiv, L'viv, Kharkiv, Dnipropetrovs'k, Fastiv, Debaltseve, Zhmerynka and Smila. There are six territorial sections in the organisational structure of railway transport in Ukraine: Southwest (centred on Kyiv), L'viv, South (Kharkiv), Donets'k, Pridniprovye (Dnipropetrovs'k) and Odesa. The main goods transported by rail are coal, ores, ferrous metals, oil and oil derivatives, and mineral-based raw materials for construction, together constituting 62.3% of all transport volume. The busiest rail sections are Kryvyi Rih–Dnipropetrovs'k–Debal'tseve, Kryvyi Rih–Fastiv–L'viv, and the lines leading towards the seaports of Odesa, Berd'yansk and Mariupol'.

Pipelines have a prominent role to play in the transport of crude oil, natural gas and their derivatives, ranking third with respect to transported freight volumes across all goods (12.8%). Of this amount, 74.2% belongs to gas and 24.9% to oil and its derivative products. This mode of transport is of high significance for the domestic economy and plays an even more important role in international trade. The density of pipeline networks reach their maximum in the west and east of the country, being somewhat lower in the central regions. The average density of pipeline is 72.4 km per 1,000 km^2 across the country as a whole.

Waterway transport ranks far below the above branches in importance, and occupies the last place both in passenger traffic (1.1%) and freight transported (1% or 12 million tons). The latter is overwhelmingly for domestic purposes and is used for international trade only to a lesser extent. Most of the cargo is of a solid nature: coal and coke – 13.4%, mineral raw materials for construction (including cement) – 43.3%, metals – 10.8%, and iron ore – 21.0%. In 2004, the volume of freight traffic passing through the Ukrainian seaports amounted to 131.8 million tons with the following distribution: 50% were exports, 9% imports, 38% were goods in transit, and 3% was domestic traffic. Cargo handled by the Ukrainian river ports equalled 12.4 million tons: 21% exports, 5% imports, 1% transit, and 73% domestic freight traffic.

Within the international export of services, transport represented 76.1% of the sector in 2004. Its value totalled 4.0 billion USD distributed in the following manner: pipelines – 46.7%, sea – 16.2%, rail – 17.7%, air – 11.3%, and others – 8.1%. In the same year, transport made-up 22% of the international import of services.

Telecommunication. In 2004 the turnover of communications service providers in Ukraine (with a variety of ownership struc-

Fig. 70 **INTERNATIONAL TRANSPORT CORRIDORS**

Author: Razov, V.
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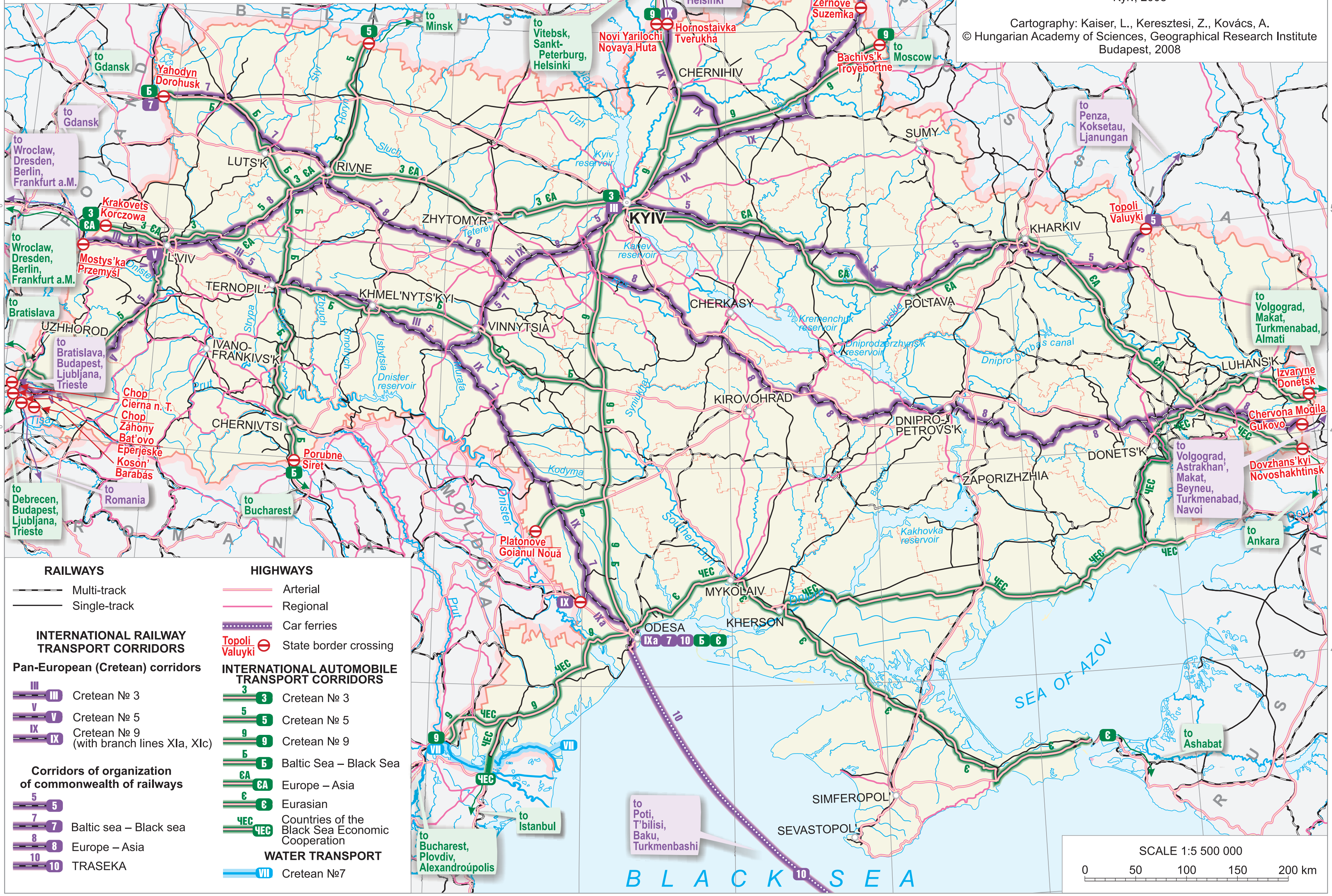
Kyiv, 2008

Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.

Budapest, 2008



tures) was 21.1 billion UAH, including services for the domestic population for the sum of 8.4 billion. Revenues from these services were attributable as follows: postal – 4.5%; telephone – 41.7% (28.6% interurban and international calls); broadcasting and the reception of television and radio programmes – 2.5%; I.T. services – 4.4%; mobile telephone networks – 44.9%; and other types of communication – 2%. The sector is characterised by a marked prevalence of operators in shared public-private ownership, providing 92.4% of all services. State ownership is overwhelming for postal services (98.4%) and the supervision and maintenance of electricity networks (100%).

Primary network of telecommunication. Today Ukraine benefits from a broad network of communications, and is a predominantly analogue network inherited from the former USSR. In 1992 a radio relay line from Kyiv, up to the satellite receiver station "Azimuth" (Ciscarpathia) was put into operation. Its basic task was the establishment and maintenance of contact with Western Europe and North America. The inauguration of the station was the first step toward digitising the primary network in Ukraine.

Until mid-1997, the basic cross-border connection was only provided by this Kyiv–L'viv radio relay line and the satellite link (the latter carried half of the international traffic of Ukraine during the Soviet period). It was only in 1995 that fibre optic technology was utilised to improve and extend the primary telecommunication network. It was during this year that some sections of fibre optic cable were laid from L'viv to Uzhhorod, and also from L'viv to the border with Poland, Slovakia and Hungary. The first line of significant length was laid-down in 1996, when Ukraine became part of the ITUR international project (Italy–Turkey–Ukraine–Russia) – an undersea fibre optic cable line, with a 250 km section belonging to Ukraine and reaching the shore near Odesa.

A logical (and physical) enlargement of the project was a 1,000 km fibre optic cable system called "Pivden" (or "South", running from Kyiv to Odesa), which started commercial operation in 1997 (*Figure 71*). With its incorporation of 8,000 connectivity channels, the percentage utilisation of the expensive satellite link had been reduced to 5% by the end of 1997. In the same year, the lines "Pivnich" (or "North" running up to the border with Belarus) and the fibre optic trunk line "Zakhid" (or "West" from Kyiv to L'viv) were put into operation.

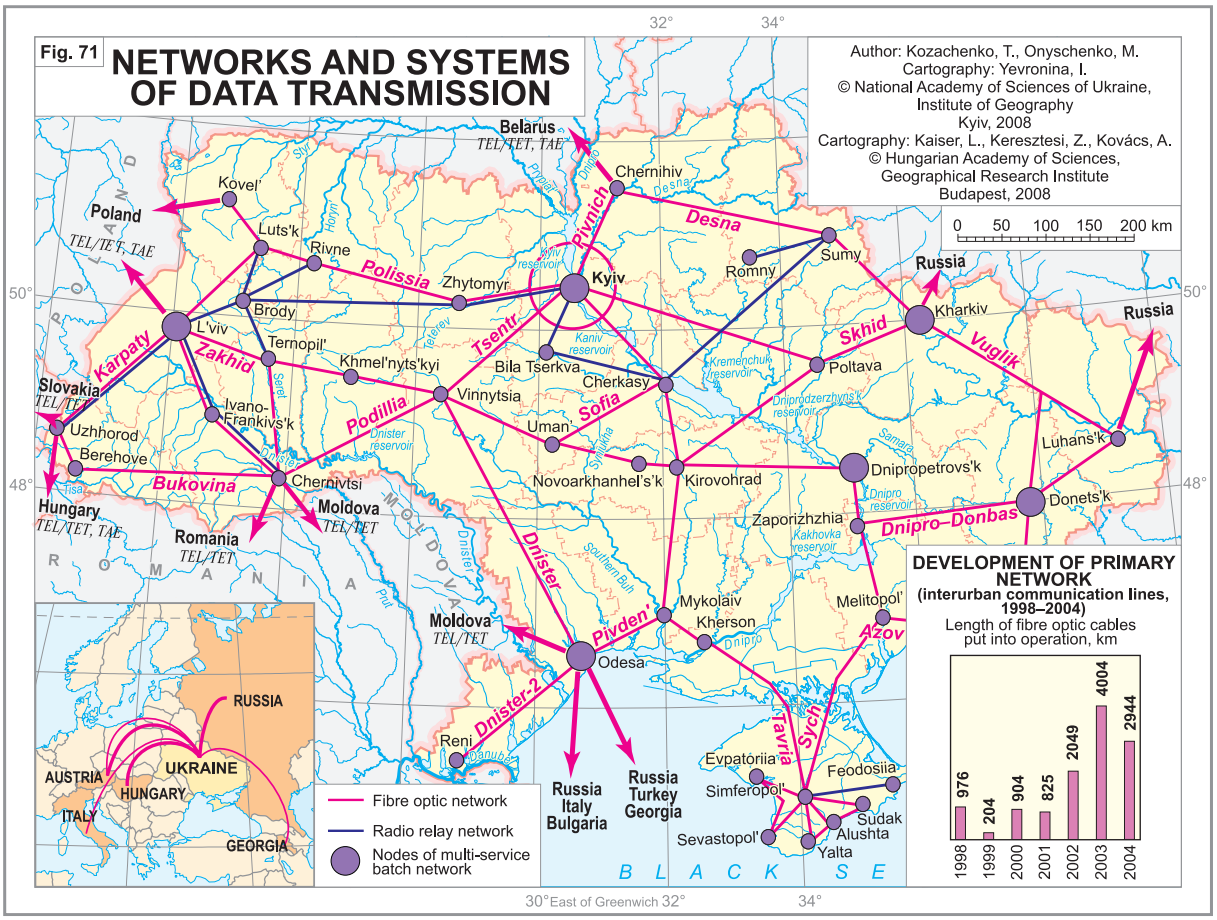
This accelerated network development can be attributed to responsibilities undertaken by Ukraine within the projects TEL (Trans European Fibre Optic Telecommunications Line) and TAE (Trans Asian–European Fibre Optic Cable System). Thus, TEL allowed the unification of the Central and Western European networks into a single European system whilst TAE will result in the systems of several Asian countries being linked to Europe, with the ultimate goal as the creation of a transit trunk line from Frankfurt-am-Main (Germany) to Shanghai (China). Currently, the latest project to be completed is an undersea segment of TAE called BS FOCS (Black Sea Fibre Optic Cable System), with the joint efforts of Ukraine and other countries in the Black Sea basin, which would be a double benefit for TAE and provide access to the whole system for the countries of the Caucasus.

With regards generally to the construction of a fibre optic system, the eastern portion of Ukraine has been lagging behind the rest of the country and the sections crossing the frontier with Russia were only completed in 1999 near Kharkiv and in 2000 near Luhans'k. Nowadays, a dense network of fibre optic and digital relay cables is widespread over the country. By 2003, fibre optic networks covered all regional (oblast) centres of Ukraine. Concomitantly with the completion of the fibre optic cable system at a trunk (magistral'nyi) level, the establishment of "volume rings" started in late 2003 and early 2004. Virtually all fibre optic trunk lines in Ukraine will be interconnected within ring structures.

Satellite connection is of utmost importance for the country's connectivity into the global information sphere. Terrestrial and undersea systems of telecommunication alone are unable to fully ensure the availability of information and to shape the communication and information infrastructure.

Ukraine is found within the service zone of 65 earth satellites set into geostationary orbit; of them 28 are used by various operators in Ukraine. These satellites have a much broader zone of coverage than the territory of the country. They broadcast television and radio programmes, and provide access to the Internet, which is today an equally important function.

Landline telephone network. In 2003 15,082 automatic telephone exchanges oper-



ated in Ukraine; of them 4,171 in urban settlements and 10,911 in rural ones. This mode of telecommunication is being gradually replaced by **mobile telephones**. Mobile phone handsets and pagers have become widespread. They are subdivided into: cellular systems for mobile telephones; paging systems; and trunking lines (link aggregation).

Cellular systems for mobile telephones are the leaders in the commercial mobile market in Ukraine. The following operators are presently available: UMC, Kyivstar GSM, Wellkom, DCC and Golden Telecom. UMC, Kyivstar GSM and DCC have the widest coverage. The network of Kyivstar GSM covers 950 urban settlements (among them the oblast seats) and includes 1,500 base stations, along with a network and switching sub-system.

Radio and television broadcasting. An extensive network of radio stations broadcast on long, medium and short wave frequencies, along with AM and FM. Radio stations of the highest broadcasting power are those of Kyiv, L'viv and Mykolaiv. The television broadcasting network consists of TV broadcasting stations with radio relay lines, cable networks and satellites transmitting the signal. The most powerful TV stations are to be found in Kyiv, Krasnohorivk (Poltava oblast), Vinnytsia, L'viv, Ternopil' and Khmel'nyts'kyi.

Science and Innovations

Ukraine benefits from a prominent potential in the field of science. In spite of the difficulties stemming from the transition to a new social and economic model, the country has succeeded in maintaining its extensive network of academic institutions, which testifies to the vitality of national science and its capability to gradually adapt to the challenges of a market economy.

In Ukraine, 1,452 organisations pursued scientific and technical R&D activities in 2006; of them 56.2% were independent scientific research institutions, 13.3% design bureaus, 3.4% planning and planning-design organisations, 11% higher education establishments, 5.4% in-house scientific-technical units and design bureaus in industrial facilities, and 10.8% other self-contained organisations. Between 1990 and 2004 the number of these institutions rose from 1,400 to 1,505, i.e. by 7%.

Nearly two thirds of *scientific organisations* are specialised in particular economic sectors (62.3%), 21.3% form part of the academic research sector, 11% are incorporated into higher education and 5.4% belong to industrial plants. 315 organisations within the academic sector are involved in fundamental research, comprising of research institutes of the National Academy of Sciences, along with academies specialising in a particular sector (agricultural, pedagogical, medical, engineering and legal). Research groups are active in 163 higher education establishments.

The natural and technical sciences are the leaders, representing 27.3% and 59.5% of establishments respectively. In 2006, 84.4 thousand people had higher-level scientific degrees, and of them 12.5 thousand were Doctors in science.

Expenditure on *scientific investigation and development* amounted to 1.2% of GDP in 2004, with a meagre contribution from the state sector (0.42%). Most scientific research into new kinds of techniques was undertaken in the City of Kyiv (32.8%), and oblasts centred on Kharkiv (22.8%), Dnipropetrovs'k (8.0%) and Donets'k (7.9%) (*Figure 72*).

Leaders in the field of *technological innovation* are the City of Kyiv (29.4%), and oblasts of Donets'k (14.0%), Kharkiv (13.2%) and Dnipropetrovs'k (9%). The great majority of industrial plants adopting scientific innovations are to be found in the City of Kyiv (37.1%), Kharkiv oblast (13.6%), AR of Crimea (13.3%), and the oblasts of Chernihiv (10.8%), Ivano-Frankivs'k (10%), Ternopil' (9.7%) and Kherson (9.6%).

A wealth of *scientific potential* is concentrated in the National Academy of Sciences of Ukraine, with 164 separate institutions. They are dispersed across many urban settlements and belong to seven scientific centres: Northwestern, Donets'k, Western, Southern, Northeastern, Pridniprov'ye and Crimean.

A close interrelationship can be observed between the spatial concentration of scientific-technical potential, the intensity of innovation activity, and regional differences between the economic strength of oblasts, their level of social and economic development, and the sector-specific structure of production, etc. There is a characteristic pattern in focal areas where scientific research organisations, groups of scholars and academic connections tend to be concentrated. Foci of different magnitudes can be identified, the first being Kyiv; Kharkiv coming second; Donets'k and Dnipropetrovs'k third; L'viv and Odesa fourth; and Simferopol' fifth in the rankings (*Table 20*).

With respect to the forces of globalisation, Ukraine is strongly impacted by the leading powers of the world economy, and also notably by Russia as its closest neighbour, itself possessing significant economic potential. Within Ukraine, a marked spatial differentiation has been shaped by the relationship between the core and peripheries. 40% of GDP is produced by five regions (Kyiv and the oblasts of Donets'k, Dnipropetrovs'k, Zaporizhzhia and Odesa), which also share 59% of foreign direct investment, produce 67% of total exports and consume 65% of imports (2004). They also have the highest figures relating to dynamics in the sphere of innovation and infrastructure networks (*Figure 73*). There is a tenfold difference in magnitude between the leading region and those that are lagging behind, and similar disparities are also common at the lower administrative level of division.

Fig. 72

SCIENTIFIC-TECHNICAL RESOURCES

Author: Kozachenko, T., Kurach, T.
Cartography: Molochko, V.
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Kyiv, 2008

Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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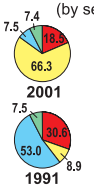
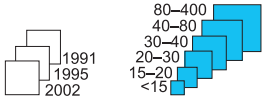
SCALE 1:5 500 000
0 50 100 150 200 km

UKRAINE. EMPLOYEES WITH PRIMARY OCCUPATION IN SCIENTIFIC ORGANISATIONS
(by sectors, %)



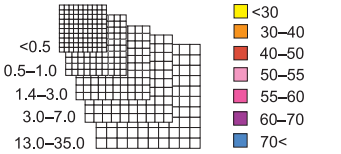
Academic institutes
Sectoral institutions
Higher education
Industry

SCIENTIFIC AND SCIENTIFIC-TECHNICAL ORGANISATIONS
(units, 1991-2002)



WORKERS IN SCIENTIFIC INSTITUTIONS
(by personnel categories, thousand persons, 2002)

RESEARCHERS (2002)



EMPLOYEES IN SCIENCE AND SCIENTIFIC SERVICE
(persons per 10,000 population, 2001)

UKRAINE. SCIENTIFIC AND SCIENTIFIC-TECHNICAL ORGANISATIONS (1991–2002)

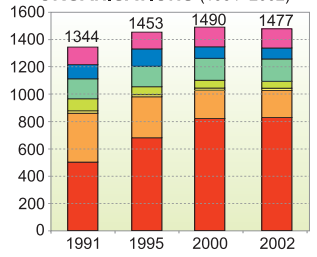


Fig. 73

INNOVATION ACTIVITY

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Cartography: Molochko, V.
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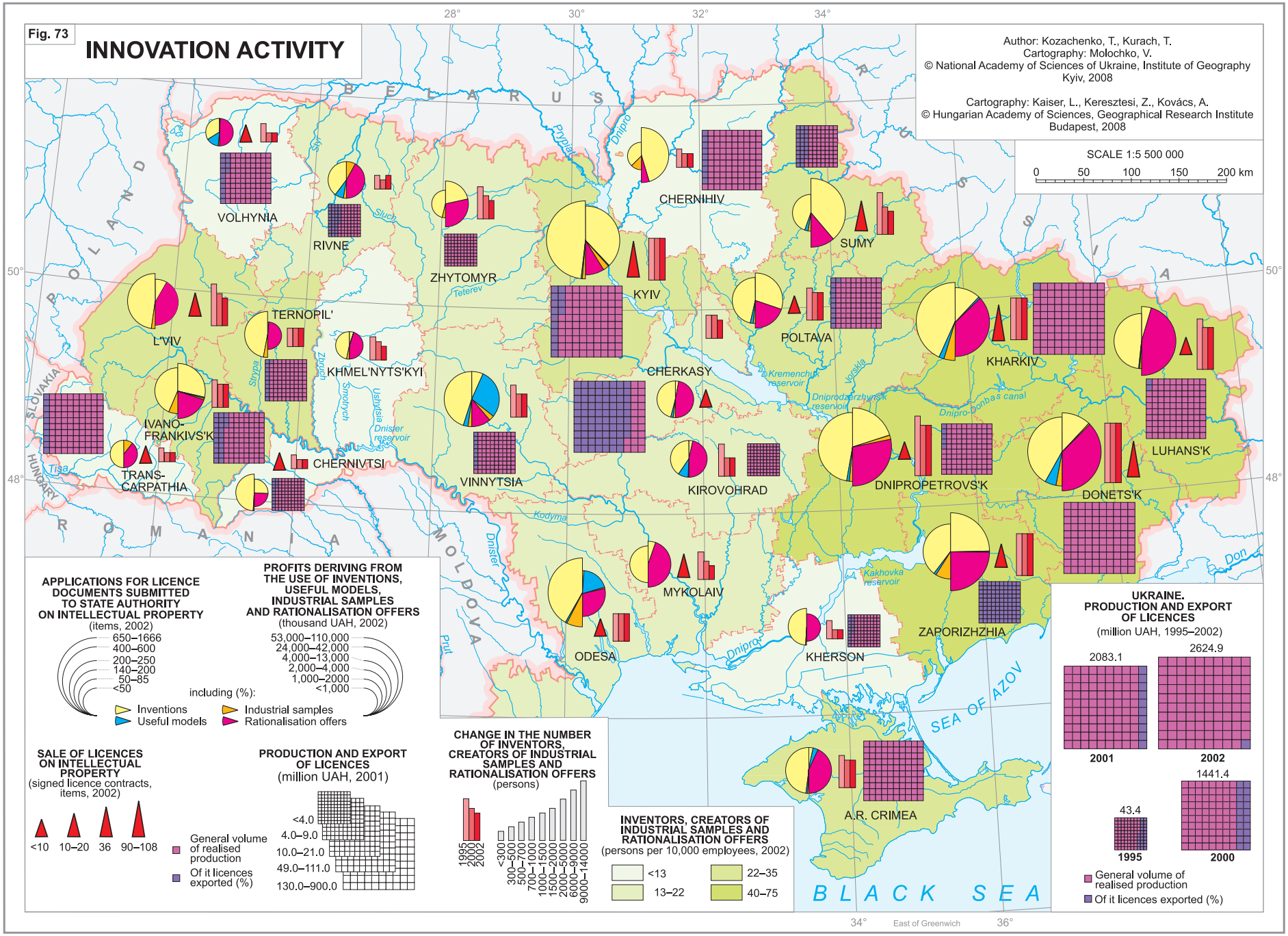
SCALE 1:5 500 000
0 50 100 150 200 km



APPLICATIONS FOR LICENCE DOCUMENTS SUBMITTED TO STATE AUTHORITY ON INTELLECTUAL PROPERTY
(items, 2002)

650–1666
400–600
200–250
140–200
50–85
<50

including (%):
Inventions
Useful models

PROFITS DERIVING FROM THE USE OF INVENTIONS, USEFUL MODELS, INDUSTRIAL SAMPLES AND RATIONALISATION OFFERS
(thousand UAH, 2002)

53,000–110,000
24,000–42,000
4,000–13,000
2,000–4,000
1,000–2000
<1,000

including (%):
Industrial samples
Rationalisation offers

SALE OF LICENCES ON INTELLECTUAL PROPERTY
(signed licence contracts, items, 2002)

<10 10–20 36 90–108

PRODUCTION AND EXPORT OF LICENCES
(million UAH, 2001)

General volume of realised production
Of it licences exported (%)

<4.0
4.0–9.0
10.0–21.0
49.0–111.0
130.0–900.0

CHANGE IN THE NUMBER OF INVENTORS, CREATORS OF INDUSTRIAL SAMPLES AND RATIONALISATION OFFERS
(persons)

1995
2000
2002

<300
300–500
500–700
700–1000
1000–1500
1500–2000
2000–5000
6000–9000
9000–14000

INVENTORS, CREATORS OF INDUSTRIAL SAMPLES AND RATIONALISATION OFFERS
(persons per 10,000 employees, 2002)

<13
13–22
22–35
40–75

UKRAINE. PRODUCTION AND EXPORT OF LICENCES
(million UAH, 1995–2002)

2083.1
2624.9
2001
2002
43.4
1441.4
1995
2000

General volume of realised production
Of it licences exported (%)

Table 20. ***Scientific centres of Ukraine: Scientific-technical resources and research projects***

Name of scientific centre	Hub of the centre	Oblasts affected	Weight, %									
			By the number of organisations	By the number of experts	By the volume of research projects	Total	By the quantity of projects focusing on new developments in					
							Techniques	Technologies	Materials	Plants and animals	Methods, concepts	Other
North-western	Kyiv	Vinnytsia, Zhytomyr, Kyiv, Kyiv oblast, Khmel'nyts'kyi, Cherkasy, Chernihiv	35.1	36.8	41.5	41.9	41.2	34.5	43.0	32.3	36.2	43.9
Donets'k	Donets'k	Donets'k, Luhans'k	9.0	11.1	8.6	7.7	11.8	16.5	14.6	6.8	12.5	5.7
Western	L'viv	Volyn, Transcarpathia, Ivano-Frankivs'k, L'viv, Rivne, Ternopil', Chernyvtsi	13.6	8.8	6.1	17.5	6.5	9.3	11.7	12.2	16.2	20.1
Southern	Odesa	Mykolaiv, Odesa, Kherson	9.0	7.8	8.8	6.4	6.4	6.0	4.4	17.1	6.1	6.5
North-eastern	Kharkiv	Poltava, Sumy, Kharkiv	19.0	20.2	20.7	14.9	22.3	14.7	17.5	17.5	20.8	12.8
Pridniprovye	Dnipro-petrovs'k	Dnipropetrovs'k, Zaporizhzhia, Kirovohrad	10.4	11.7	11.6	7.6	10.5	14.1	7.7	8.2	4.9	6.5
Crimean	Simfe-ropol'	Crimea	3.8	3.6	2.7	4.0	1.2	4.8	1.2	6.0	3.3	4.4

Sources: Osaulenko, O.G. (Ed.) 2004. Statystychnyi schorichnyk Ukrainy za 2004 rik, Derzhavnyi komitet statystyky Ukrainy, Vyd. «Konsul'tant», Kyiv.

Ukraine is embarking on serious efforts to deal with the challenges of globalisation: the information technology sector is sprouting roots, Ukrainian corporations are well-established and developing, there are positive changes within the tertiary sector, and the transfer of technology is expanding. At the same time, the negative effects of globalisation are also being felt: there is an outflow of labour, an influx of material-intensive production leading to environmental deterioration and financial pressures are growing.

Recreation and Tourism

In spite of the fact that Ukraine is a dynamically developing target country for international tourism, it is lagging far behind the premier European nations in terms revenue from tourist turnover. Ukraine was the 13th most frequently visited country on the continent in 2006, outpacing such prominent rivals as Croatia, Portugal and Greece, but it came last but one when earnings from international tourism were considered. This spectacular difference stems from a poor exploitation of the tourist potential of the country, i.e. the touristic environment is far from conducive for foreign visitors to leave their money. An examination of tourist demand reveals that this is partly attributable to the specific market conditions, as inbound tourism is represented chiefly by a massive inflow of visitors from relatively poor neighbouring countries (Russia, Moldova and Belarus) (*Table 21*). Along with growing interest from abroad, there is sizeable internal tourism; 90% of overnight stays in registered accommodation are undertaken by Ukrainian citizens themselves. Wider international appeal is inhibited by a relative instability in the internal political situation, a scarcity of available information on the country, an inadequacy of infrastructure, and a meagre supply of services. The visa policy of the European Union, vis-a-vis Ukrainians, by no means encourages foreign travel on the part of Ukrainians to the EU, and Ukraine is not a significant source country for EU visitors.

Natural attractions are, however, decisive for the future success of tourism in Ukraine. The geographical setting of the country, possessing a variety of natural environments, framed by seas and chains of mountains lends Ukraine considerable potential for tourism. Climatic and landscape resources underpin this potential, with the Carpathian and Crimean mountains, the attractions of the Black Sea and Sea of Azov coasts, an abundance and diversity of subsurface mineral waters, and more than 70 thousand rivers. Climatic conditions for recreation and leisure during the summer period are particularly favourable. The duration of this season fluctuates from 105 days in Polissia to 180 days along the southern coast of Crimea.

Among European countries, Ukraine has only modest quantities of ***forested areas***, so woodland cannot be labelled a truly valuable natural recreational resource. Forests suitable for recreational purposes extend to around 4 million ha., and only one fourth of them is ready for development. They cover the highest proportion of land in Transcarpathia (54% of total area), in certain oblasts (Ivano-Frankivs'k (45%), Rivne (42%), Zhytomyr (36%), and in

Table 21. ***Foreign citizens visiting Ukraine, by country (2006)***

	Number of foreign visitors	Main motivation of visit (in %)			
		Business trip	Organised tourism	Private visit	Other
Total	**18,935,775**	**5.3**	**6.4**	**87.4**	**0.9**
Russian Federation	6,429,264	4.4	4.3	90.6	0.7
Poland	3,979,453	3.9	3.4	92.5	0.2
Moldova	3,056,433	3.8	0.4	95.6	0.3
Belarus	2,127,250	2.5	15.0	82.2	0.3
Hungary	1,159,711	2.8	7.8	89.4	0.1
Slovakia	506,045	10.1	6.9	82.7	0.3
Romania	349,094	5.5	0.9	93.0	0.6
Germany	215,437	17.1	30.1	51.1	1.6
United States	113,507	16.5	36.5	41.0	6.0
Italy	63,337	21.9	38.7	37.4	2.0
Other countries	936,244	24.7	22.4	44.5	8.4

Source: www.ukrstat.gov.ua

other regions in the northwest of the country. They are widely enjoyed for their healthy environment, opportunities for berry and mushroom picking, and sporting activities.

Swamps can also give rise to recreational opportunities and they are widespread in Rivne (19% of the area), Chernihiv (over 11%), Volyn (over 8%), and Zhytomyr (over 5%) oblasts. Regrettably, it has not been possible to enjoy the overwhelming majority of swamps for over 20 years since the Chernobyl' accident. Short visits for scientific purposes are the only realistic use of these resources.

Surface waters, relevant for a broad spectrum of recreational activities, are found in abundance in the following oblasts: Volyn (over 22% of the territory), Transcarpathia (ca. 17%), L'viv (over 14%), Rivne (almost 14%), Ternopil' (over 13%), and Khmel'nyts'kyi (ca. 13%). There is a particular scarcity of such resources in Donets'k (2.2%), Dnipropetrovs'k (2.1%), Kherson (1.2%) and Odesa (0.8%) oblasts. Lakes naturally represent an excellent recreational resource and they are the most notable from a medicinal aspect in Crimea, Odesa and Kherson oblasts. Around 30 lakes of recreational importance are to be found in west Polissia, centered on the town of Shats'k. Limans in the mouth of the Dnister and Dnipro rivers are particularly attractive for mass tourism and leisure, as are the shallow bays of Yahorlits'ka, Tendrivs'ka and Dzharylhats'ka in the north of the Black Sea.

Seaside beaches are, naturally, another popular destination for mass tourism. They are numerous along the Black Sea and Sea of Azov, on the territory of AR Crimea, and in Odesa, Mykolaiv, Kherson, Zaporizhzhia and Donets'k oblasts. Crimea is the winner with beaches extending over 517 km of the 906 km long coastline. The widest beaches (30–50m) are typical of the Azov coast of Crimea. The average width is 10m along the southern coast, which is the most suitable for leisure. The bathing season in most parts of Ukraine lasts no longer than 80 days, but along the northern coast of the Black Sea it reaches, and can even exceed 120 days.

The ***mountains*** of the Carpathians and those of Crimea are another notable recreational resource. Due to their climatic conditions, the former are particularly favoured by winter-sports fans. The skiing season lasts 90–100 days of the year. It is here that all the resources for skiing are concentrated in Ukraine: mountains of medium elevation with considerable gradients, a humid climate and extensive forest coverage (up to 40%). The deep valleys accommodate resorts with favourable microclimatic conditions and are protected by mountain ridges (Yaremcha, Vorokhta, Kosmach). The Crimean mountains, though less suitable for winter recreation, provide opportunities for mountain hiking, alpinism, rock climbing, speleotourism and other extreme sports.

The Carpathians, Crimea and Podillia (Ternopil' oblast) are rich in ***speleological resources*** (caves and karst features). Caves have formed in karstifying rocks: in limestone (Crimea), shell rock (Odesa oblast), or gypsum (west Ukraine). The caves are appealing for tourists to visit thanks to their interesting formations. Besides natural caves, there are numerous underground cavities created by humans (in Crimea, Kyiv, Odesa, Chernihiv and other oblasts). These are variously historical, with objects and structures carved into the rock or take the form of catacombs, underground fortifications, etc.

Mineral waters with curative qualities are one of Ukraine's most valuable natural resources. Examples of all the basic balneological waters are to be found and most of them do not have specific components. Carbonic waters are found predominantly in the Carpathians and to a degree in Transcarpathia. Hydro-sulphuric waters are encountered in Ciscarpathia and Crimea. Waters with chlorine and sodium content, along with radonic waters are also highly notable and are found in Vinnytsia, Zhytomyr, Kyiv, Kirovohrad and Khmel'nyts'kyi oblasts. A number of spas have been exploiting these spring waters, such as Khmel'nik.

Certain subsurface waters are considered rare: the arsenic waters of Transcarpathian springs and boric waters in Crimea and the Carpathians. Further, there are other unique water types with high organic matter content, otherwise known as the celebrated "Naftusia" waters, around which the renowned spas of Truskavets and Shkidnytsia have developed. Beyond medicinal waters, Ukraine is rich in deposits of ***mud***, possessing medical qualities. Deposits of ozokerite are considered unique (L'viv oblast) and large amounts of mud are found in the limans of Kuial'nits'kyi, Khadzhybeis'kyi and Tylihul's'kyi (Odesa oblast), along with Lake Chokrats'ke in Crimea.

The success of tourism is highly influenced by the quality of the natural environment, and the living standards of the local populace, both of which can influence the perceptions of guests. A combined assessment of the natural environment providing living conditions for the population is presented on *Figure 21*.

As with other European countries, the **history** of Ukraine has been punctuated by dramatic events, leaving battlefields of both national and global importance, venues that hosted the signing of treaties and accords that have been decisive in history, and places where famous people either lived or were visited by them. The most important of these locations are to be found in the oblasts of Rivne (Berestechko), Poltava (Poltava), Chernihiv (Kruti), Kyiv (Pereiaslav-Khmel'nyts'kyi), Cherkasy (Chyhyryn, Korsun Shevchenkivs'kyi), etc., and in Crimea (Sevastopol', Yalta). The remains of ancient historical settlements can also be included in the same category. These are ***archeological sites*** on the Black Sea coast and in Crimea, formerly home to the communities established prior to Kievan Rus' (5^{th} – 9^{th} centuries), along with settlements dating from its existence (10^{th} – 13^{th} centuries). Over 500 human settlements in Ukraine reach back over more than 900 years of history. Several areas, particularly rich in history and culture are centred on them. The list of *UNESCO World Heritage sites* includes the following three locations: the historic centre of L'viv; Saint-Sophia Cathedral, its related monastic buildings, and Kyiv-Pechersk Lavra in Kyiv; and Struve Geodetic Arc (a chain of survey triangulations) with key geodetic points at Baranivka, Katerynivka (Antonivka), and Felshtin (Hvardiiska), all in Khmel'nyts'kyi oblast and Stara Nekrasivka (Odesa oblast).

Ukraine has tremendous potential for tourism arising from its wealth of historical and cultural attractions.. The total number of the most important ***historical and archeological monuments***, combined with notable ***architectural and artistic attractions***, amounts to 2,334 sites. The density and diversity of these monuments is the highest in Kyiv and its oblast, the oblasts of L'viv, Poltava and Kharkiv, and in AR Crimea. Fewer are found in Luhans'k, Kirovohrad and Donets'k oblasts. The majority of sites are of the architectural type; of them 1,186 are religous and 955 are secular in nature. The architectural category has at least 10 examples of European and global significance in each oblast. There are 145 notable examples of military architecture and are spread across 18 oblasts, whilst those falling into the group of landscape architecture (the 19 most important parks and gardens) are encountered in 10 oblasts. At least one attraction of European or global interest is found in 19 oblasts of Ukraine. The total number of sites of archeological, historical-architectural, urban architectural and other importance in the country amounts to around 50 thousand. Sacred attractions may also present a considerable draw for tourists. Of the 12,069 sacred structures in Ukraine, 3,464 are of architectural monuments. They are most widespread in L'viv (703), Ivano-Frankivs'k (541), Ternopil' (410) oblasts, and are scarce in Kharkiv (64) and Kirovohrad (47) oblasts.

Considerable tourist potential is found in ***rural settlements***, where authentic national costumes are still worn by local people, and folklore customs, traditions and crafts are maintained (predominantly in the oblasts of Ternopil', Khmel'nyts'kyi, Poltava, Chernihiv).

Although international hotel chains do not consider Ukraine to be a primary target for expansion, the ***infrastructure for accommodation*** is broad-based, with a wide range of facilities (*Figure 74*). There is a prevalence of establishments receiving large quantities of tourists during the summer period (ca. 2,000 locations with more than 274 thousand beds in 2006). Most of the state-run institutions are sanatoriums and health resorts for people undergoing medical treatment (capacity for 150 thousand, with 37 thousand reserved for children), whilst boarding houses for leisure visits have a capacity of over 60 thousand. From a regional aspect, a great number of sanatoriums are located in Crimea (with a capacity of 55 thousand), followed by L'viv oblast (ca. 17 thousand) and Odesa (ca. 15 thousand). Kirovohrad and Sumy oblasts (with a total capacity of below 500, each) are the least well endowed.

The concentration of **leisure locations and infrastructure** in certain settlements prompted the design of a map showing which urban and rural settlements are recreational centres (*Figure 75*). Ukrainian tourists can chose between a total of 1,200 hotels, motels, campsites and tourist bases. The City of Kiev and Crimea have the highest concentrations of tourists.

According to data released by the National Institute for Leisure and Tourism,

Fig. 74

HEALTH RESORTS AND RECREATION

Author: Kozachenko, T.
Cartography: Molochko, V.
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Kyiv, 2008

Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.
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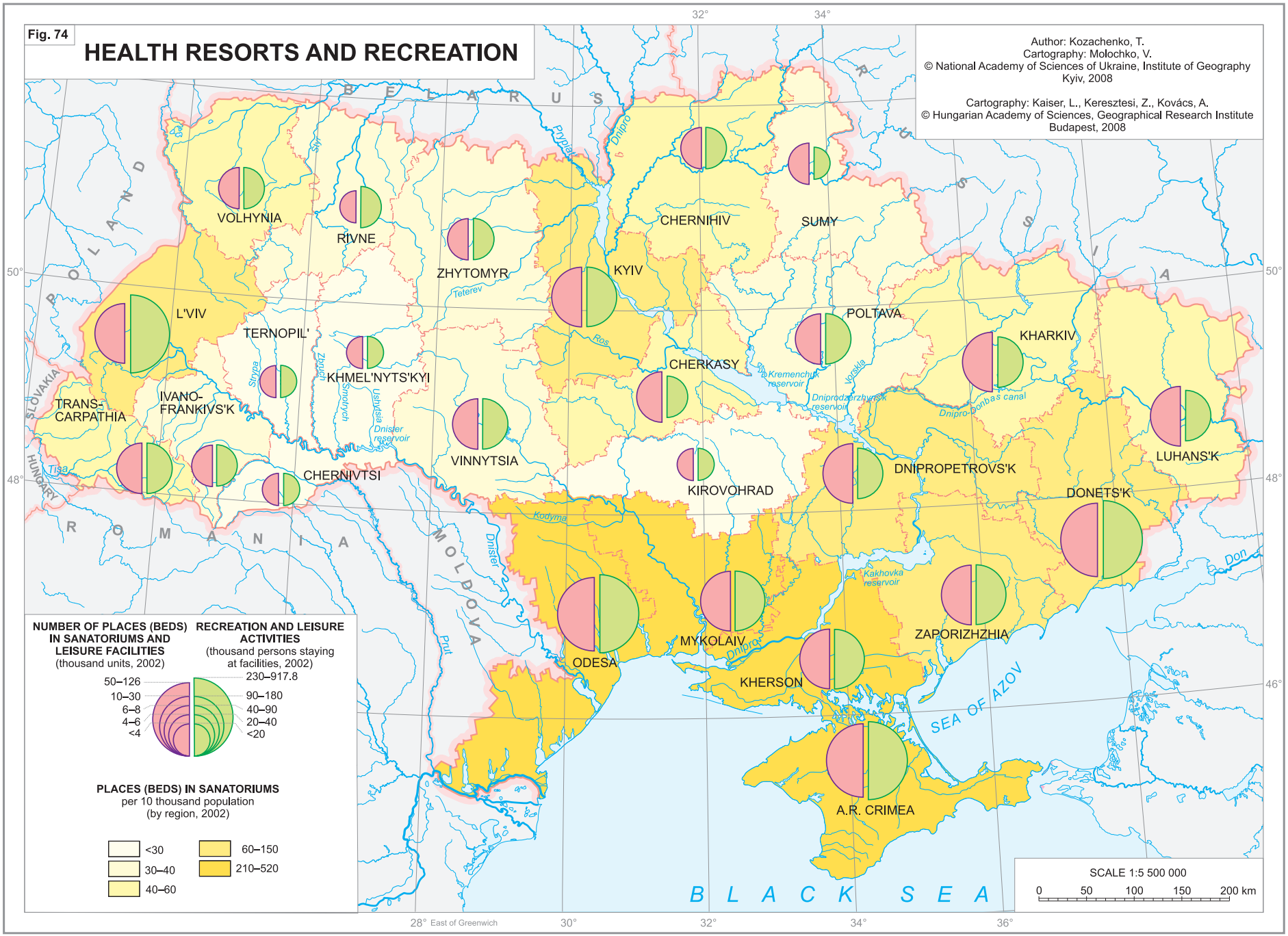
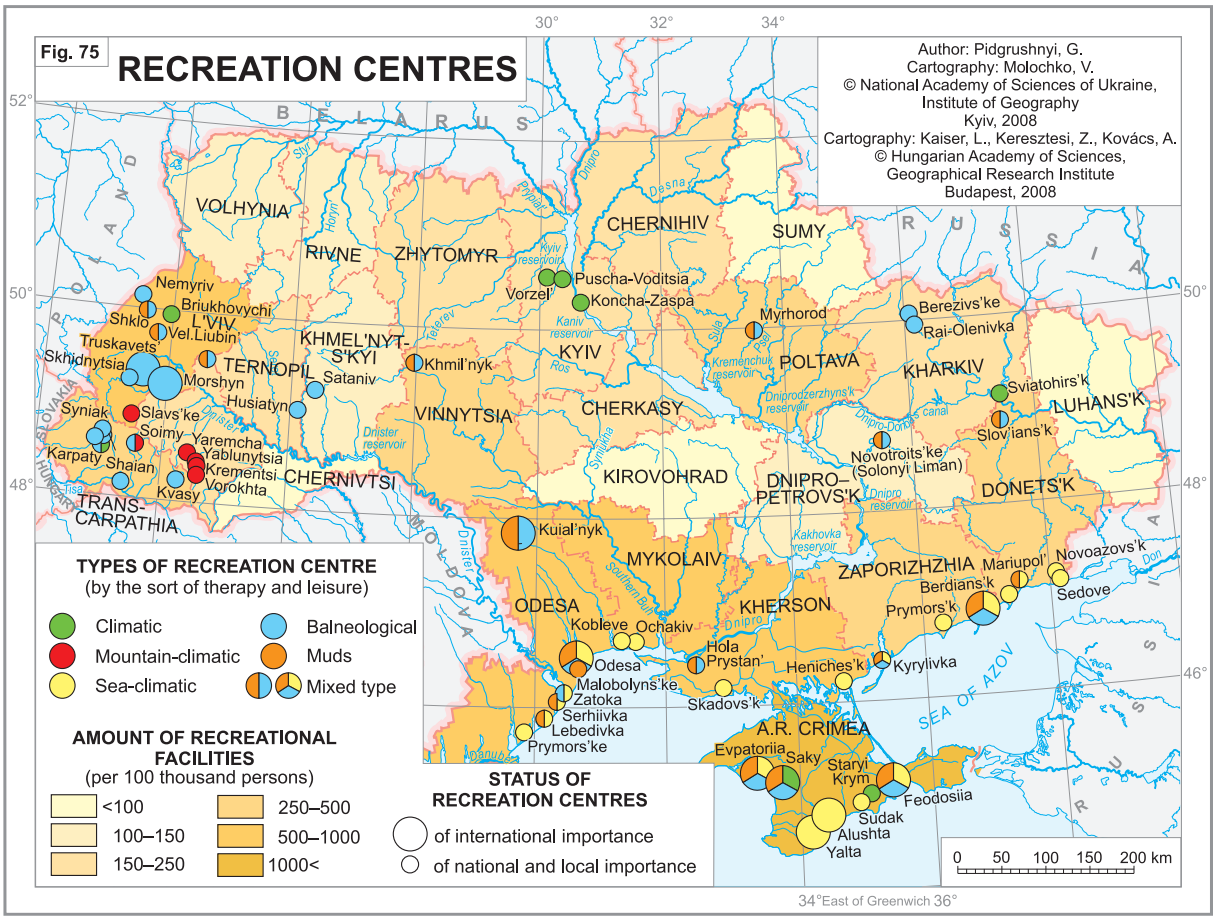




Ukraine was visited by 18.9 million **foreign tourists** in 2006, which is a 7.4% increase compared to the data for 2005 (*Figure 76*). Around 60% of tourists arrived from CIS countries, and one third from the European Union. Of all foreign visitors, 34% were from Russia, and 21% were Polish nationals. Further, a significant proportion was represented by visits from citizens of Moldova (16.1%), followed by those of Belarus (11.2%), Hungary (6.1%), Slovakia (2.7%), and Romania (1.8%). 16.9 million of Ukrainian citizens travelled abroad in 2006. Of them 49% visited CIS countries and 44% headed for the EU member states (*Figure 77*).

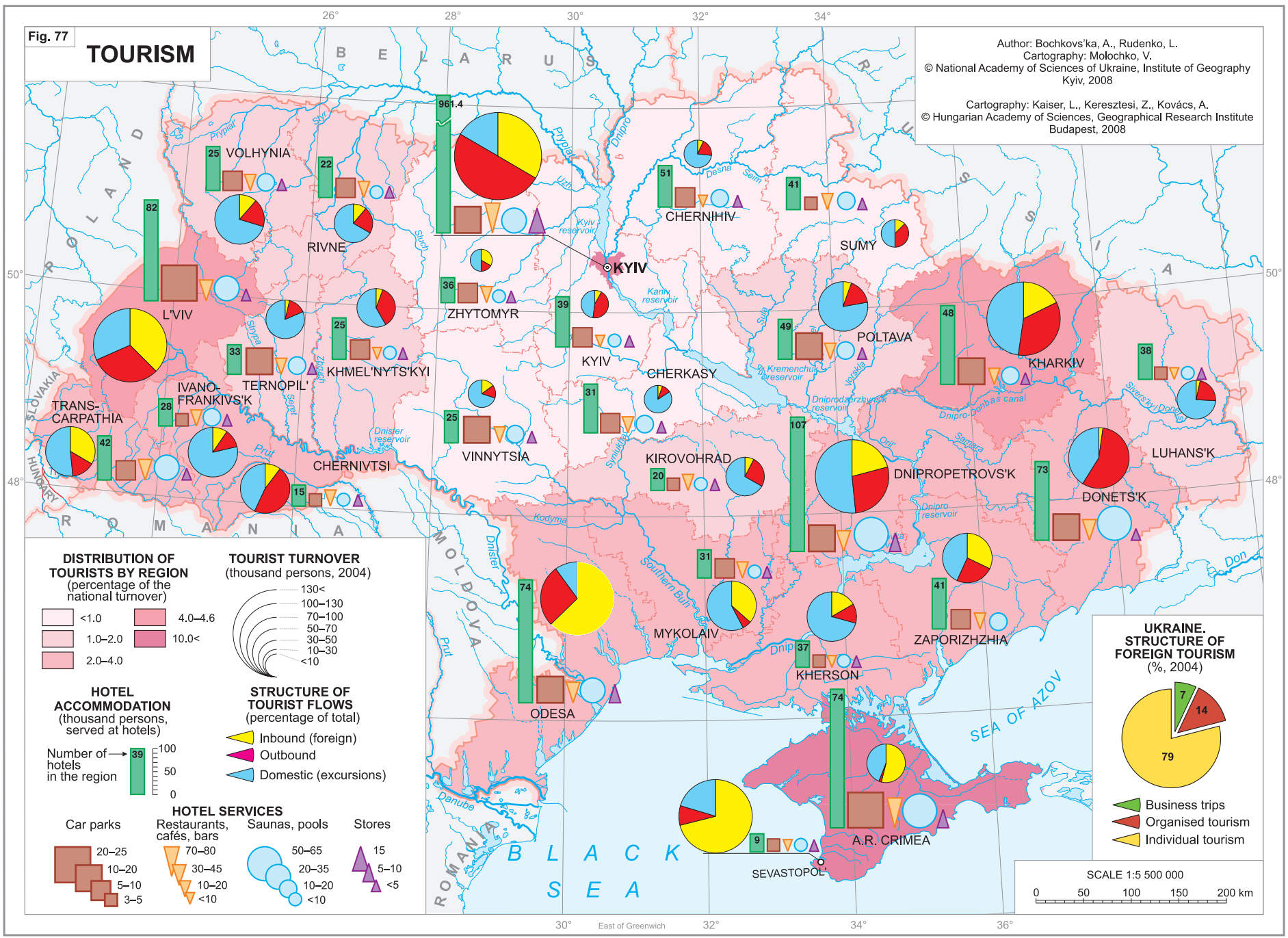
The future development of tourism in Ukraine chiefly depends on the social, economic and political environment. Long-term stability could act as a magnet not only for potential tourists, but for investors in the tourism industry as well. Efficient marketing communication, a higher level of education and training of experts, combined with product orientated thinking could be a guarantee for the competitiveness of the country in international tourism.

Fig. 77

TOURISM

Author: Bochkovs'ka, A., Rudenko, L.
Cartography: Molochko, V.

Cartography: Kaiser, L., Keresztesi, Z., Kovács, A.



DISTRIBUTION OF TOURISTS BY REGION
(percentage of the national turnover)

- <1.0
- 1.0–2.0
- 2.0–4.0
- 4.0–4.6
- 10.0<

TOURIST TURNOVER
(thousand persons, 2004)

- 130<
- 100–130
- 70–100
- 50–70
- 30–50
- 10–30
- <10

HOTEL ACCOMMODATION
(thousand persons, served at hotels)

Number of hotels in the region → 39 (100, 50, 0)

STRUCTURE OF TOURIST FLOWS
(percentage of total)

- Inbound (foreign)
- Outbound
- Domestic (excursions)

HOTEL SERVICES

Car parks	Restaurants, cafés, bars	Saunas, pools	Stores
20–25	70–80	50–65	15
10–20	30–45	20–35	5–10
5–10	10–20	10–20	<5
3–5	<10	<10	

UKRAINE. STRUCTURE OF FOREIGN TOURISM
(%, 2004)

- Business trips
- Organised tourism
- Individual tourism

SCALE 1:5 500 000
0 50 100 150 200 km

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Since the disintegration of the USSR, the Western world has shown an ever-growing interest in Ukraine, its people and its economy. As the second-largest country in Europe, Ukraine has a strategic geographical position at the crossroads between Europe and Asia. It is a key country for the transit of energy resources from Russia and Central Asia to the European Union, which is one reason why Ukraine has become a priority partner in the neighbourhood policy of the EU. Ukraine has pursued a path towards the democratic consolidation of statehood, which encompasses vigorous economic changes, the development of institutions and integration into European and global political and economic structures. In a complex and controversial world, Ukraine is building collaboration with other countries upon the principles of mutual understanding and trust, and is establishing initiatives aimed at the creation of a system that bestows international security.

This recognition has prompted the Institute of Geography of the National Academy of Sciences of Ukraine (Kyiv) and the Geographical Research Institute of the Hungarian Academy of Sciences (Budapest) to initiate cooperation, and the volume entitled "Ukraine in Maps" is the outcome of their joint effort. The intention of this publication is to make available the results of research conducted by Ukrainian and Hungarian geographers, to the English-speaking public. This atlas follows in the footsteps of previous publications from the Geographical Research Institute of the Hungarian Academy of Sciences. Similar to the work entitled South Eastern Europe in Maps (2005, 2007), it includes 64 maps, dozens of figures and tables accompanied by an explanatory text, written in a popular, scientific manner. The book is an attempt to outline the geographical setting and geopolitical context of Ukraine, as well as its history, natural environment, population, settlements and economy. The authors greatly hope that this joint venture will bring Ukraine closer to the reader and make this neighbouring country to the European Union more familiar, and consequently, more appealing.

ІНСТИТУТ ГЕОГРАФІЇ НАН УКРАЇНИ
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