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Environmental trends and perspectives in the Western Balkans: future production and consumption patterns

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European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark
Tel.: +45 33 36 71 00
Fax: +45 33 36 71 99
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

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List of abbreviations

BOD	Biological oxygen demand
CLRTAP	Convention on Long-range Transboundary Air Pollution
CSI	Core set of indicators (EEA)
EBRD	European Bank for Reconstruction and Development
EEA	European Environment Agency
Eionet	European Environment Information and Observation Network
EMAS	Eco-Management and Audit Scheme
ETC/SCP	European Topic Centre on Sustainable Consumption and Production
EU	European Union
EU-12	The 12 Member States that joined the EU in 2004 and 2008
EU-15	The 15 Member States that joined the EU before 2004
EU-27	All 27 EU Member States since 2008
EU-25	The 25 EU Member States between 2004 and 2008
FAO	Food and Agriculture Organization
GDP	Gross domestic product
GEO	Global Environment Outlook (published by UNEP)
GHG	Greenhouse gas
GRID	Global Resource Information Database
HDI	Human Development Index
IEA	International Energy Agency
IIASA	International Institute for Applied Systems Analysis
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organisation for Standardization
IUCN	World Conservation Union
MAP	Mediterranean Action Plan
NGO	Non-governmental organisation
NMVOC	Non-methane volatile organic compounds
NO_X	mono-nitrogen oxides
$PM_{2.5}$	Particulates smaller than 2.5 micrometres in diameter
PM_{10}	Particulates smaller than 10 micrometres and larger than 2.5 micrometres in diameter
REC	Regional Environmental Centre for Central and Eastern Europe
STEEP	Social, technology, economic, environment and political (drivers)
STEEPL	Social, technology, economic, environment, political and legislative (drivers)
UN	United Nations
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	UN Industrial Development Organization
VOCs	Volatile organic compounds
WB	Western Balkans
WBCSD	World Business Council on Sustainable Development
WHO	World Health Organization
WWF	World Wide Fund for Nature

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Other contributors to the report include: Jozsef Szlezak and Ruslan Zhechkov (Regional Environmental Center, Hungary, consortium partner of the EEA European Topic Centre on Sustainable Consumption and Production (ETC/SCP)), Almut Reichel (EEA, Sustainable Consumption and Production Group) and Peter Kristensen (EEA, Water Group).

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Summary

The countries of the Western Balkans are at a turning point in the development of their economies, societies and environment. Among the key issues facing Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia and Serbia (as well as the territory of Kosovo under UN Security Council Resolution 1244/99) are the pace of their integration with the European Union and the prospect of future membership. European integration represents an important opportunity and also a challenge in terms of reforming national institutions, policies and laws. The region's economies face the task of shifting from their industrial past to advanced, post-industrial economies. National policies moreover need to address changing consumption patterns and the growth of consumerism driven by societal reforms and shifts, which will have a growing impact on the region's environment.

The choices that governments in the region make concerning these and other pressing questions today will influence not only the region's environment in the coming decades, but also that of other European countries. For this reason, a future-oriented perspective is important. This study seeks to encourage future-oriented discussions and actions in the Western Balkans by providing an analysis of the forces that are shaping the future of the region's environment. In particular, it highlights the importance of drivers and of changing consumption and production patterns on the region's environment.

Part I of the study reviews recent environmental trends in the region. The important issues today include the following:

- pollution and health remain important concerns, notably air pollution in urban and industrial areas and wastewater discharges from these areas;
- while countries in the Western Balkans have acted to protect the region's remarkable biodiversity, there is much need for ongoing work and additional research;
- resource use, in particular land use, and waste are undergoing a series of changes, including the abandonment of agricultural land, especially in mountain areas, and growing sprawl around many cities and towns and along coastlines, and these growing urban areas are generating higher levels of urban waste;
- many issues that need to be tackled are legacies from the past, related to war, old industrial sites, illegal waste dumping and shipment, the extraction of minerals and others. This puts additional burden on the countries in the region, which also need to deal with current transition challenges.

Part II of the study highlights drivers that will affect the region's environment in future decades. These include, for example, future climate change, which will affect water resources and biodiversity, as well as trends in a range of economic sectors, including agriculture and energy, which is heavily reliant on hydroelectricity.

The study links drivers to changing consumption and production patterns, which will be a key factor of environmental change in coming decades: these patterns are described in Part III. If current trends continue, such as the increasing demand for personal mobility and changing patterns of food consumption, they will have wide-ranging impacts on the environment. Many of the changes will influence resource use and waste. Moreover, land use changes such as the sprawl of urban areas, development of coastal areas, changes in forest management land use changes related to energy supply needs and the abandonment of agricultural land will in turn affect the natural resource use and rich biodiversity of the Western Balkans. This is an important concern, as other drivers, such as climate change, will also influence biodiversity. A forward-looking perspective should consider these existing trends and their interactions, as well as investigate the uncertainties concerning their future development and possible new challenges and opportunities that may arise.

Recent environmental trends

Pollution is an important concern in terms of environmental health. Air pollution remains an important problem in many urban and industrial

areas, due to emissions from industry and from motor vehicles. Problems found in specific areas include the continued use of leaded petrol and high-sulphur diesel in some countries, as well as emissions from ageing mines and power and manufacturing plants. While national trends have varied, for several key pollutants such as acidifying substances, total regional air emissions from the Western Balkans have not changed greatly in recent years, however better information support is needed to evaluate these trends more accurately.

Freshwater quality also varies significantly across the region, which has pristine mountain streams as well as rivers polluted by industrial and urban wastewater and agricultural run-off. Concentrations of key pollutants, such as organic pollution and ammonium, remained largely steady in the first five years of the decade.

A high share of the population has access to safe drinking water, according to data gathered by the United Nations Development Programme (UNDP). However, a smaller share is attached to sewerage systems, and wastewater treatment is poor or non-existent in many urban and industrial areas.

The countries of the Western Balkans are rich in biodiversity, due in part to the region's variety of geography and habitats, though some of the region's specific habitats still need more investigation, such as old tectonic lakes and ecosystems specific for Dinaric karst region — landscape which is characterised by sinkholes, underground streams and caves. This natural wealth has been threatened in recent years by urban sprawl, agricultural land abandonment, illegal timber cutting, infrastructure projects and other pressures. Countries in the region have taken important steps to protect biodiversity and natural areas: notably, the extent of protected areas in the region has grown steadily in recent years. However, they are unlikely to meet the European goal to halt biodiversity loss by 2010.

Greenhouse gas emissions from the region increased rapidly in the first years of this decade, though per capita emissions remain lower than the EU average. Croatia has a target to reduce its emissions under the Kyoto Protocol.

In terms of natural resource use, the region has seen important changes in land cover. In 2000, about 45 % of land in the Western Balkans was used for agriculture, and forests covered a further 40 %. In recent years, however, many areas of agricultural land have been abandoned, in particular small farms in remote areas, esepically in mountains and mining areas. Urban areas have sprawled; so has construction for tourism in coastal zones.

Coastal areas in the Western Balkans face a further set of pressures, such as effluents and solid waste from urban and tourist areas, eutrophication of coastal waters and sprawl along coastlines. Despite these pressures, the quality of coastal bathing water in the region remains quite good — for example, nearly all sites in Croatia met national standards in 2005.

The marine environment of the Adriatic and Ionian Seas is affected by land-based pollution and overfishing, as well as pressures from marine transport, including transport of petroleum and natural gas, and from natural gas extraction in the Northern Adriatic (an important share of these pressures comes from countries outside the Western Balkans).

In recent years, the generation of municipal waste has risen steadily in the Western Balkans, and it is currently estimated to be at levels similar to those in the EU-12 (data on solid waste, however, are poor). Municipal waste management is weak in many parts of the region and many waste facilities are old. Abandoned landfills are a problem. In addition, both ongoing and accumulated industrial waste, and in particular mining waste, is also a serious problem in some areas.

The countries share many water resources, including in the Danube basin and tributaries such as the Sava River. In the summer, however, water scarcity can be a problem in southern countries, in coastal areas and on islands, especially in leaky karstic regions.

Driving forces

A series of social, economic and other drivers will shape the region's future. Table S.1 lists the main forces identified and reviewed in this study. This list is based on the STEEP framework, developed for future analysis (see also Box 2.1). It builds on the work for the EEA's 2007 study, *The pan-European environment: glimpses into an uncertain future* (EEA Report No 4/2007).

In coming decades, the population of most of the countries in the region is projected to decline and age; demographic growth will continue only in Albania and Kosovo as defined by the United Nations Security Council Resolution 1244. Migration patterns are less certain. The region must still resolve the legacy of migrants who in the 1990s left to escape conflict and economic problems. In coming

Table S.1 The STEEPL driving forces

Social	Population and migration
	Culture, values and needs
Technology	Technology
Economic	Globalisation and trade
	Macro-economic development
	Markets and business
Environment	Global environmental change
Politics	Politics
Legislation and policy	Legislation and policy

decades, countries may see further departures to richer countries; migrants arriving from other continents and regions; and domestically, further movements from rural to urban areas.

Based on these trends, households are expected to become smaller, resulting in higher consumption per capita: for example, energy for heating needed per person will increase. Migration patterns are likely to continue agricultural land abandonment as well as pressures for sprawl in urban areas.

In terms of culture and values, many households in the Western Balkans are seeking to catch up with western levels of consumption, though traditional consumption patterns continue in the region. These forces will also shape future consumption patterns, such as the food people buy, how they use energy and the extent of traffic. These consumption patterns will directly affect the environment in the Western Balkans.

Some studies see the possibility of a new global industrial revolution based on new technology, such as breakthroughs in information technology, biotechnology and nanotechnologies. New discoveries and inventions could help address climate change and other problems — but they could also create new threats for the environment. Innovation policies in the Western Balkans could influence which technologies are introduced in the region. Some countries have a strong scientific tradition and could take an active role, cooperating with Member States in the EU and around the world.

Globalisation has linked the world economy through markets, investment, technology and communications.

However, links such as trade have spread the environmental impacts of production and consumption across the globe. For example, the countries of the Western Balkans export large quantities of minerals to the EU — but suffer the environmental problems related to mining. The future of globalisation is uncertain in the face of today's economic problems. Security fears in the future might also weaken these links. Future trade and investment patterns help to shape agriculture as well as fuel and mineral extraction in the Western Balkans.

The current global economic crisis highlights the uncertainty of macro-economic development, though it offers opportunities for the future, such as seeking a new global 'green deal'. National economic governance will shape the economies of the Western Balkans as well, and thus could have a different influence on the environment. Economic growth can increase environmental pressures: as people in the region have higher disposable incomes, they may change their consumption patterns, which will result in greater environmental impacts. At the same time, economic growth can provide resources to address environmental issues, such as financing for investments.

In recent decades, markets and business have played a growing role in the global economy. Around the world, enterprises have encouraged consumption patterns that use high amounts of natural resources, though some have adopted environmental management systems to reduce their pressures on the environment. In the Western Balkans, markets and business have taken some environmental initiatives, and they could have an important role in supporting environmental solutions in the future.

Global environmental change will affect the environment in the Western Balkans. Climate change is expected to bring higher summer temperatures and lower rainfall and to shape agriculture, hydroelectricity production and energy use. In addition to the general changes in biodiversity that are already taking place at a global level, climate change is expected to have a significant impact on the region's biodiversity — global losses could affect the rich biodiversity in the Western Balkans; moreover, loss of biodiversity in the region could affect biodiversity and ecosystem services important also for other parts of Europe as well as globally.

Politics at all levels — global, EU, regional and national — will set the scene for environmental policies, laws and actions in the coming decades, and thus will have a strong influence on environmental trends. Political futures are, by

nature, uncertain, but especially so for this region. At global level, the extent of cooperation or conflict among nations will be vital in terms of determining the world's economic and social framework in coming decades. This choice between conflict and cooperation will affect the extent and effectiveness of international environmental agreements. The future of the European Union — both its internal effectiveness and its enlargement policies — is also uncertain: and its future will, however, greatly influence Western Balkan politics as well as environmental laws and policies in the region. Special historically determined role is identified for neighbouring countries to Western Balkan region, be it as a liaison for economic development and EU accession or in the management of the environmental impacts. Also the countries east from Balkans will be important shaping factor for the future developments.

Countries in the Western Balkans need to address a number of political problems, including a generally low level of public governance, which hinders effective implementation of all policies and legislation.

Future developments of legislation and policy will also affect the region. Strong global agreements to tackle climate change could change transport and energy systems around the world, including those in the Western Balkans. The future of EU environmental laws and policies will also have a key role in the region. Countries can strengthen their environmental legislation by harmonising with EU requirements. For these steps to be effective, however, governments will need to improve their implementation of environmental policy, including enforcement actions.

These drivers (which are described in detail in Chapter 2) will influence consumption and production patterns in the region, described in Chapters 3 and 4. Table S.2 summarises the links between driving forces and consumption and production patterns.

Household consumption patterns

Unsustainable patterns of consumption around the world are a major cause of environmental problems, from climate change to resource degradation and biodiversity loss. In the Western Balkan countries, household consumption patterns are of key interest as they have changed rapidly in recent years.

Three areas account for about two-thirds of all environmental pressures from consumption in EU Member States, and these bear close attention in the Western Balkans. These are: food and drink; housing and infrastructure (including residential heating, which is a focus in this report); and the transport of persons and goods.

Food consumption patterns will influence environmental impacts throughout the food production chain, and in particular impacts arising from agriculture and fisheries. In the Western Balkans, traditional patterns continue to influence household food choices — for example, strong ties to rural areas and family farms. New consumption patterns, facilitated by new supermarkets and processed food products, are spreading quickly — and these will increase environmental impacts related to food.

Food is, of course, closely tied to personal well-being. Across the region, malnourishment has declined since the 1990s, most likely due to the end of conflicts and a return to broad economic growth. Current economic problems could reverse this trend. Another health problem, however, has grown in recent years: the increase in the number of overweight and obese adults in the region.

Residential buildings are the largest single consumer of energy in the Western Balkans, mainly for heating (though electricity use for air conditioning and appliances is increasing). In some countries of the region, poorer households continue to use inefficient electric heaters. Many also use fuel wood and coal, which contribute to both indoor and local air pollution. Building construction and demolition is also an important source of waste, and construction has fuelled sprawl in urban and coastal areas.

Personal mobility is another growing source of environmental impacts. Passenger transport in the Western Balkans rose by 40 % between 2000 and 2007; the volume of air travel tripled, and road travel also increased. These trends affect air pollution, especially in urban areas, as well as greenhouse gas emissions. Many private motor vehicles in the region are old and highly polluting, and this increases pollution problems. An outlook for a much larger area, Eurasia, sees an ongoing increase in private road and air transport to 2050 — and if current trends continue, mobility will increase in the Western Balkans as well.

Production patterns

Small farms make up the bulk of the agricultural sector in the Western Balkans. However, many of

Table S.2 The links between driving forces and production and consumption patterns in the Western Balkans

STEEPL driving forces that will influence the Western Balkans		The geographic scale of the most important driving forces				How these driving forces can shape future patterns of production and consumption in the Western Balkans (focusing on food, energy, transport)	
		Global	EU	WB	National	Consumption patterns	Production patterns
S	**Population and migration** Key trends: ageing populations, declining household sizes Key uncertainties: patterns and extent of migration			√	√	**Strong, direct influence:** Smaller, ageing households may buy more processed foods and consume more energy per person In-migration will increase consumption Rural to urban migration will increase sprawl	**Indirect influence:** With ageing rural populations and migration to urban areas, farmland will be abandoned (esp. in mountain areas)
	Culture, values and needs Key uncertainties: consumerism and 'catching up with west' vs. traditional and green values		√	√		**Strong, direct influence:** Culture and values will influence the types of food people consume and their preferences for personal mobility	**Indirect influence:** Can influence business awareness of environment
T	**Technology** Key trend: influence of technology low in short term; will grow over time Key uncertainties: introduction of new technologies vs. public fears of risks; EU and Western Balkan efforts to develop and implement 'greener' technologies	√	√			**Direct influence:** Technology will create new food products for consumers Transport technologies will change impacts of personal mobility Influence on environment could be both positive and negative	**Strong, direct influence:** Technology will influence agriculture, energy production and freight methods Can reduce environmental impacts of production New technologies (e.g. nano and bio-technologies) can bring new risks
E	**Globalisation and trade** Key trend: EU expected to remain main trade partner for Western Balkans Key uncertainty: will globalisation continue in coming decades?	√	√			**Direct influence:** Extent of import of exotic foods for consumption in region Global prices of oil and other fuels will influence energy use, personal mobility	**Strong, direct influence:** Global and EU agricultural trade patterns will affect farming in the Western Balkans International demand for marine fish (esp. tuna) Global prices of oil and other fuels will influence energy, freight investments Oil and gas transit will bring environmental risks
	Macro-economic development Key uncertainties: levels of economic growth at global, EU and regional scales	√	√	√	√	**Strong, direct influence:** Economic growth is closely linked to household incomes and spending on consumption	**Strong, direct influence:** Economic growth closely linked to enterprise investments Enterprise restructuring in the region could lead to greater efficiencies
	Markets and business Key uncertainties: extent of business action for the environment at global, EU and regional scales; food retailing sector in Western Balkans		√	√	√	**Direct influence:** Future retail sector will influence food products available Automobile industry can develop, promote lower emissions vehicles	**Strong, direct influence:** Food retailers will influence regional farming methods Enterprises and manufacturing methods will determine levels of freight transport
E	**Global environmental change** Key trends and uncertainties: pace of global warming and biodiversity loss	√				**Indirect influence:** Global warming will affect energy consumption in the region	**Strong, direct influence:** Global warming and biodiversity loss will directly influence agriculture and fisheries Changing precipitation levels will affect hydropower

Table S.2 The links between driving forces and production and consumption patterns in the Western Balkans (cont.)

STEEPL driving forces that will influence the Western Balkans		The geographic scale of the most important driving forces				How these driving forces can shape future patterns of production and consumption in the Western Balkans (focusing on food, energy, transport)	
		Global	EU	WB	National	Consumption patterns	Production patterns
P	**Politics** Key uncertainties: global cooperation vs. conflict; EU effectiveness and enlargement; cooperation and national reforms in Western Balkans	√	√	√	√	**Strong, indirect influence:** Political developments will determine many other driving forces; e.g. joining EU will affect legislation and policy influencing consumption	**Strong, indirect influence:** Political developments will determine many other forces, from global economic growth to EU legislation Regional cooperation for energy, environment can influence production
L	**Legislation and policy** Key uncertainties: strength of global environmental agreements; future EU legislation; national implementation of environmental laws	√	√		√	**Direct influence:** EU and national legislation can affect many areas: e.g. influence food products; promote energy efficiency; set requirements on motor vehicles	**Strong, direct influence:** Global climate agreements and EU laws can change energy production EU environmental legislation and its national implementation will affect production methods

these small farms are being abandoned — especially in mountain areas — as people move from rural to urban areas, and also as the population ages. Conflicts in the 1990s also led to farm abandonment. At the same time, agricultural production is increasing — and fertiliser use increased in the 1990s, indicating that farming in the region has become more intensive.

Fleets of numerous small boats dominate marine fishing in the Adriatic and Ionian Seas, though it is hard to sketch an accurate picture: data on the fleets in Western Balkan countries have not been available; moreover, countries outside the region — notably Italy and Greece — have major fleets in these seas. Data on the current status of fish stocks are also incomplete, though overfishing is a major concern throughout the Mediterranean.

Aquaculture is a growing activity in the coastal zones of the Western Balkans. It brings a range of environmental impacts: notably, where wild species are used as feed, aquaculture can increase overfishing.

Locally mined coal and lignite supply a large share of energy production in the Western Balkans — and this creates air pollution, greenhouse gas emissions and solid waste and water pollution from mines. Hydroelectricity is another important source, and it affects freshwater ecosystems. Other renewable sources are little used in the region.

The region's cumulative energy intensity in terms of gross domestic product (GDP) improved slightly in recent years, though it remains much higher than in EU Member States. Energy use per capita, however,

Table S.3 The links between production and consumption patterns and environmental futures in the Western Balkans

Consumption patterns	Production patterns	Environmental pollution [a] and human health	Climate change: greenhouse gas emissions	Ecosystems and biodiversity	Resource use and waste generation [b]
Food consumption	Agriculture and fisheries	••	••	•••	•••
Household energy consumption	Energy production	•••	•••	•	••
Personal mobility	Freight transport	•••	•••	••	••

Notes: [a] including air and water pollution
[b] including land use, freshwater consumption, marine ecosystems and waste

Strength of the links: • Weak influence; •• Medium influence; ••• Strong influence

The scores are based on the assessment in Chapters 3, 4 and 5 of this report.

is lower. The countries in the region thus have a key task in terms of continuing to reduce energy intensity as GDP increases.

Freight transport has increased rapidly in the Western Balkans — between 2000 and 2007 it rose by about 100 %, far faster than GDP. Freight transport contributes to air pollution. The Danube river provides an important alternative to road transport, though works to increase navigation on the Danube and its tributaries could harm the basin's freshwater ecosystems.

The future development of these production and consumption patterns will directly affect the environment in the Western Balkans. Table S.3 shows the intensity of the links between production and consumption patterns and the environment.

Impacts on the region's environment — some glimpses into the future

A few outlooks are available for the Western Balkan environment. These, together with outlooks for wider geographic areas in Europe, sketch out the expected impacts if current trends continue in coming decades.

Among these impacts, pollution and health issues will remain an important concern in the region:

- emissions of some air pollutants are expected to decline over the coming decade, though it is not clear if this will improve local air quality;
- the countries in the region face a major challenge in terms of improving drinking water and wastewater treatment services.

Greenhouse gas emissions from the Western Balkans are projected to increase. Climate change impacts are expected to become strong. Moreover, the region's rich ecosystems will face ongoing threats.

Other problems will affect natural resources in the region:

- coastal and urban sprawl threatens to continue, along with depopulation and land abandonment in rural areas, especially in the mountains;
- overfishing is likely to remain a threat in local seas;
- uncontrolled exploitations of forests is an issue to be managed in the context of sustainable developments and expected climate change;
- municipal solid waste is growing, and the management of waste streams remains a problem.

These trends and their outcomes are not inevitable. Changes in the key drivers could yield other futures. Alternative futures could take shape in response to sudden, unexpected changes: for example, an energy crisis or new technology. Other scenarios might arise if trends currently projected for the region — such as European integration and ongoing economic growth — are not realised, or if governments, business and other actors in the Western Balkans lead the way to a different path.

Information base to support forward-looking integrated environment assessments in the Western Balkans

This study shows that the poor base of region-wide information makes it difficult to develop a reliable assessment of the environmental situation, as well as a good picture for many of the drivers shaping the future. Information is difficult to obtain, data are often scarce, incompatible or missing. In many cases there is also lack of qualitative information. In the areas of waste, greenhouse gas emissions, water use and the maritime environment in particular, many types of data are missing or large gaps exist, preventing a strong regional assessment. Also, for biodiversity and forestry, it is difficult to obtain a good region-wide picture as data are very dispersed and often incompatible. Moreover, further scientific research is needed to clearly map the biodiversity strengths of the region and to link such results more clearly with policy-making. Information on the status and trends in the use of natural resources (fish stocks, water, land use, contaminated sites) also is not available. Information on land-use changes is important for the assessment of environmental impacts and sustainable development, so further work here is a priority.

Information support is very poor for production patterns such as agriculture, fisheries, and freight transport. The assessment of food consumption was also severely limited by the lack of quantitative and qualitative information (for example, consumption by major food groups, retail food markets and sources of food products).

Across all areas, forward-looking information is scanty. In most cases, where information is available, it can be obtained only from international sources. Since this region is experiencing extremely dynamic changes and many uncertainties, it is particularly

important to develop structured and sound information support for the future.

Regional assessments of past and present trends were possible for only 13 of the 37 indicators in EEA's core set. Outlooks were found for only four indicators, and these mainly from international sources, such as the European Monitoring and Evaluation Programme (EMEP). For 10 indicators it has not been possible to assess either past or future trends (these include indicators for urban wastewater treatment, gross nutrient balance, species diversity, packaging waste, contaminated sites and marine indicators).

These information problems need to be addressed in order to strengthen forward-looking analysis for the region.

Production, consumption — and cleaner growth

Despite gaps in the information base, the study has identified a series of major challenges for policy makers and other actors in the region to consider in the coming decades. Many of the forces influencing the state of the environment of the region arise outside the region (technology development, trade flows, global economic growth, foreign investments, EU enlargement, climate change impacts); but many crucial ones arise at national or regional levels (i.e. changing consumption and production patterns, commitment to political and economic transition and how to deal with it, feedbacks to climate change impacts in the region, demographic trends and national capacities to respond to challenges).

Among the key challenges for the countries in the Western Balkans is the adoption and implementation of new environmental laws and policies, taking particular note of EU legislation. While the countries have started this process, a further challenge is that of improving governance in order to ensure proper implementation of the new measures.

Preparing for and adapting to climate change impacts will be another key area where the region needs to prepare for the future.

Addressing the environmental impacts of consumption and production patterns will be another major challenge. By encouraging energy efficiency in buildings, for example, governments and households will be able to reduce the environmental impacts of energy production. Actions to slow the growth of personal mobility and contain urban sprawl can cut air pollution. This report seeks to provide these actors with information and analysis to address this challenge.

For the countries of the Western Balkans, addressing the environmental issues related to consumption and production patterns can help stimulate growth and innovation — and also avoid future costs (including costs of EU regulation implementation). For example, investments for better waste management could stem the growth in waste generation and help reduce costs of cleaning up poorly managed landfills. In industry and agriculture, such efforts could make enterprises in the region more competitive.

All the actors in the region — including governments, business, NGOs and others — have a role in shaping its future environment. Study shows that number of uncertainties can be managed and beneficial developments can arise if taking in account driving forces at appropriate level (national, regional, neighbouring countries, the EU and others). Threats and scenario analyses also showed crucial importance of the regional cooperation within the Balkan region as well as with the neighbouring countries. It is hoped that this study will encourage all actors concerned with the sustainable development of the Western Balkans to look closely at the forces and trends shaping the future and to prepare for the challenges of the coming decades.

Introduction

This study looks at the forces shaping the future of the environment in the Western Balkans, and in particular at the role of consumption and production patterns. The study begins with a review of key recent environmental trends in the region. The study then analyses the drivers — such as social, political and economic forces — that are shaping production and consumption patterns. Changes in these patterns will directly influence the region's environment. The study goes on to look at several key areas; in particular, household consumption patterns and related production patterns. The study discusses outlooks of possible environmental futures and how drivers and changing consumption and production patterns might influence these outlooks. It concludes by looking at how different actors in the region can act to shape environmental futures.

The study takes a futures perspective because the countries of the Western Balkan are at a turning point in the development of their economies, societies and environment. The challenges and opportunities that the countries in the region face today include the following:

- the need to address issues remaining in the aftermath of the conflicts of the 1990s;
- the opportunity to consolidate the shift in political focus from regional conflicts to engagement with the European Union and other international bodies;
- the opportunity to shift from industrial to post-industrial economies. This shift requires highly competent management, flexibility in the organisation of work, the introduction of innovative technology, public sector institutions that can support economic competitiveness and the development of effective partnerships between the private and public sector ([1]);
- the need to address past environmental problems, such as those that have arisen from the legacy of their 20th-century industrial development;
- the need to prepare for new environmental issues, such as the pressures arising from new consumption patterns, the impacts of global climate change, and issues arising from biodiversity loss.

A futures perspective is valuable in addressing the complex set of challenges and opportunities that the region faces. It provides a broad view of drivers, production and consumption patterns and environmental futures. This is important as in the long term, political, economic and other changes may exacerbate some environmental problems, create new ones and provide the means to address existing issues. Thus, addressing environmental challenges in a sustainable manner requires a close review of plausible future developments in other sectors and the potential implications of these drivers on the environment.

Assessing production and consumption patterns provides an important perspective on these dynamics. The Johannesburg World Summit on Sustainable Development highlighted the importance of these patterns in shaping environmental problems and called for a move towards sustainable consumption and production. This study focuses on selected patterns, in particular on key areas of household consumption in the Western Balkans, as well as related production patterns. Household consumption patterns in the region are changing rapidly and are playing a growing role in terms of their impacts on the environment.

Forward-looking studies in the Western Balkans

This report draws on many existing forward-looking studies. The analysis in such studies can help policy makers, stakeholders and the interested public think about future problems. While they cannot predict

([1]) Adam, F.; Makarovic, M.; Roncevic, B. and Tomsic, M. (2005), *The challenges of sustainable development, the role of socio-cultural factors in east and central Europe*, Central European University.

the future, these studies can address the combination of issues that these actors face, help them assess the complexities and uncertainties and set realistic, long-term paths. Such studies thus provide the context for taking far-sighted actions today.

A wide range of methods are used to study future issues and concerns. These include: quantitative projections or forecasts, narrative scenario studies in combination with quantitative tools, horizon scanning, mega-trend analysis, back-casting, road mapping, system dynamics, sensitivity analysis and probabilistic analysis ([2]).

The future is being studied in the Western Balkans to a limited degree. A literature search in 2006 identified 34 future-oriented studies on the region, of which 10 focus on environment and sustainability topics and the remainder on other issues (Table I.1) ([3]).

Among the environmental future studies, only the topic of climate change is studied separately. Here, most of the studies identified are national communications prepared under the United Nations Framework Convention on Climate Change (UNFCCC) ([4]). These reports forecast

Table I.1 Forward-looking studies in the Western Balkans

Topic	Regional and multi-country studies	Albania	Bosnia and Herzegovina	Croatia	The former Yugoslav Republic of Macedonia	Montenegro	Serbia	Total
Air								
Biodiversity								
Climate change	1	1		2	1			5
Fisheries								
Forestry								
Land use								
Waste								
Water								
Environment and sustainability (general)	2		1			2		5
Sub-total: environment and sustainability	**3**	**1**	**1**	**2**	**1**	**2**	**0**	**10**
Agriculture								
Demography			1	1	2			4
Economy	5			1		1		7
Energy	3			3		1		7
Health		1						1
Politics	2		1	1				4
Transport	1							1
Sub-total: non-environmental topics	**11**	**1**	**2**	**6**	**2**	**2**	**0**	**24**
Total	**14**	**2**	**3**	**8**	**3**	**4**	**0**	**34**

Source: EEA project: Review of future-related studies and analyses of uncertainties in the pan-European region, Milieu Ltd *et al.*, 2006. Lists of studies for the Western Balkans and other regions are available at http://scenarios.ew.eea.europa.eu.

([2]) For an overview of key techniques, see Sheate, W. *et al.* (2007), EEA research foresight for environment and sustainability: final report, November 2007.

([3]) In-country national and other experts were employed for each of the nine countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the former Yugoslav Republic of Macedonia, Montenegro, Romania, Serbia and Turkey), to identify studies in English and in national languages. Thus, this search, which was completed at the end of 2006, is fairly comprehensive. Further details on results can be found on the EEA scenarios website at http://scenarios.ew.eea.europa.eu and in the EEA Envirowindows at http://ew.eea.europa.eu.

([4]) Several countries have prepared more than one communication since 2000; only the most recent ones were counted.

future greenhouse gas emissions, most to 2020, and climate change impacts, often to 2100. Moreover, in order to calculate future emissions, these climate change studies forecast future economic conditions as well as other key factors, such as the growth in energy consumption and motor vehicle use. No issue-specific future studies were found on other topics, such as air pollution or forestry in the region (some relevant information can be found in studies and projections carried out for wider geographic areas, i.e. for international conventions). The other five environmental future studies cover more than one topic: some of these were prepared in the context of national strategies.

The other 24 future studies cover a broad range of non-environmental issues, from demography to transport. Economics and energy are the two areas with the highest number of studies.

Many of these future studies are cited in this report and used in its analysis, together with future studies carried out at global and European levels. However, there is the need to develop more forward-looking studies which are targeted to actual policy and environmental problems.

The socio-economic and political context

The Western Balkans comprise six countries — Albania, Bosnia and Herzegovina ([5]), Croatia, the former Yugoslav Republic of Macedonia, Montenegro and Serbia — and the territory of Kosovo under UN Security Council Resolution 1244/99 (Map I.1).

The region's economic and social conditions vary significantly (Table I.2). For example, in 2006, annual income per capita (based on purchasing power

Map I.1 Political map of the Western Balkans, 2007

Note: The declaration of independence by Kosovo under UN Security Council Resolution 1244/99 on 17 February 2008 has been recognised by over 50 countries around the world, including several of its neighbours, several EU Member States and the United States, but not by others, among them some EU Member States as well as Serbia.

Source: EEA, 2009.

([5]) Bosnia and Herzegovina is divided into two main administrative divisions: the Federation of Bosnia and Herzegovina and Republika Srpska; in addition, the district of Brčko is under international administration.

parity) ranged from about EUR 5 800 in Albania to more than EUR 14 000 in Croatia. Most of the countries have relatively similar levels in the Human Development Index (HDI) — a measure of the quality of life, incorporating life-expectancy, education, health levels and other measures of quality of life, along with economic prosperity. The HDI is close to 0.8 (on a scale of 0 to 1) for all countries except Kosovo under UN Security Council Resolution 1244/99, where it is estimated at less than half this level. In Kosovo in the middle of this decade, levels of income, poverty, unemployment and child mortality were all lower than in the rest of the region.

All of the countries have an ecological footprint that is below the average for the EU, (on average, a citizen in one of the EU's 27 Member States has an environmental footprint of 4.7 global hectares, twice the size of the capacity of the European continent to provide natural resources and absorb waste), which is only 2.1 ha/capita. Joint activities between EU and Western Balkans are needed to tackle consumption and production challenges in order to reduce unsustainable natural resources use (see more on the drivers and uncertainties for consumption and production in Western Balkans in Part III).

The countries in the region emerged from socialist economies established after World War II. Yugoslavia's form of socialism allowed significant autonomy for enterprises, individual ownership of property and the possibility of emigration. In contrast, Albania's regime established and maintained strict central planning and social control over four decades.

In the 1990s, the countries of the former Yugoslavia were engulfed in a series of conflicts that damaged populations, economies and societies. While these conflicts have ended, many issues remain in their aftermath: the status of Kosovo under UN Security Council Resolution 1244/99 is one; others include the return of refugees and the clearing of areas contaminated with land mines. While many of those who fled war have gone back to their homes, millions are still unsure of whether to return.

Over the past two decades, the economies of the Western Balkans first underwent a transition to market-based systems; they are now undertaking further policy reforms as part of their harmonisation with the EU.

Most of the region saw rapid economic growth between 1995 and 2006: for example, GDP per capita (measured in purchasing power parity) doubled in Albania and Croatia over this period and tripled in Bosnia and Herzegovina. In contrast, Serbia in particular suffered steep economic decline in 1999 due to the Kosovo under UN Security Council Resolution 1244/99 war: according to World Bank data, only in 2003 did Serbia return to its 1998 level of GDP per capita (Section 2.6 describes recent economic trends and current outlooks) ([6]).

Table I.2 Key characteristics of the Western Balkan countries

Country	Population, 2005 (million)	Surface area (thousand km²)	GDP/capita, 2006 (EUR)	Human Development Index, 2006	Ecological footprint (global ha per capita), 2005
Albania	3.1	28.8	5 814	0.784	2.2
Bosnia and Herzegovina	3.8	51.2	6 502	0.800	2.9
Croatia	4.3	56.5	14 222	0.846	3.2
Kosovo under UN Security Council Resolution 1244/99	2.1	10.9	n.a.	0.374	n.a.
The former Yugoslav Republic of Macedonia	2.0	25.7	7 898	0.796	4.6
Montenegro	0.6	14.0	9 459 *	0.799	2.6
Serbia ***	4.8	77.4	9 459 *	0.786 **	2.6

Notes: * For Serbia and Montenegro before their division.
** Recent calculations by the Republic Development Bureau of Serbia indicate a value of 0.821.
*** Serbia without Kosovo under UN Security Council Resolution 1244/99.

Source: World Bank; UNDP; Global Footprint Network.

([6]) According to the Serbian government, however, the 1998 level of GDP/capita had already been exceeded in 2002.

Overview of the sections of this report

This report reviews the environment in the Western Balkans, together with the drivers that are shaping environmental trends. Specifically, the study takes a look at how these drivers are shaping household consumption in three areas — food consumption, buildings and infrastructure and mobility — as well as production patterns. These changing consumption and production patterns will in turn affect the region's environment in coming decades. Figure I.1 provides an overview of this framework, which also provides the structure for the report.

Part I (Chapter 1) reviews recent trends in the region's environment, using indicators from the EEA's core set as well as other indicators. The chapter covers key environmental issues, including climate change, biodiversity, water, waste and air pollution.

Environmental change is firmly embedded in the wider societal context, and Part II (Chapter 2) focuses on the drivers that will influence the future of the region's environment. The chapter uses a version of the STEEP framework, which presents the social, technological, economic, environmental and political forces shaping environmental futures (a sixth category, legislation and policy, is added, see Box 2.1). The drivers themselves act at several geographic scales: from global, to European, regional and national. Figure I.1 illustrates the framework for this analysis, which links drivers — broader societal forces as well as production and consumption patterns — and the environment.

As the events of the past two decades have also shown, the dynamics of political, economic and societal developments are far from certain, Chapter 2 highlights some of these uncertainties, for example presenting alternative scenarios of the future developed in recent studies at global, European and regional scales.

These broader, societal forces in turn influence the patterns of production and consumption in the Western Balkans, which are described in Part III (Chapters 3 and 4). Chapter 3 reviews household consumption patterns in three key areas: food, buildings and infrastructure (such as water and electricity), and mobility; Chapter 4 discusses related production patterns.

Part IV looks first at the impacts of the drivers and the production and consumption patterns on possible environmental futures (Chapter 5). It then considers the role of key actors in the region in terms of shaping these futures (Chapter 6).

Figure I.1 Framework of the report

Environmental trends in the Western Balkan countries today

Described in Chapter 1

Driving forces and uncertainties shaping the future environment in the region

		Global	European	Regional	National
Social	• Population and migration • Consumer behaviour				
Technology	• Technology				
Economics	• Globalisation and trade • Macro-economic development • Markets and business				
Environment	• Global environmental change				
Politics	• Politics				
Legislation and policy	• Legislation and policy				

The STEEPL driving forces are described in Chapter 2

The driving forces will change production and consumption patterns that directly affect the environment in the Western Balkans

Chapters 3 and 4 look at the key areas of production and consumption patterns

Potential environmental futures in the Western Balkan countries

Chapter 5 discusses outlooks and alternatives for major environmental impacts

Part I: Environmental trends

1 Environmental trends in the Western Balkans

This chapter provides a brief overview of recent trends for a series of key environmental issues in the Western Balkan region, using EEA's core set of indicators. The chapter thus provides an information base for thinking about the future of the environment in the region. However, current trends cannot be simply extrapolated into the future; following this chapter, Parts II and III of the study will look at the drivers and uncertainties that are shaping the future of the region's environment, including consumption and production patterns. Part IV provides some glimpses of the possible outlooks for the future and indications of main actors that can influence the future developments.

The chapter is organised according to themes of the European Union's Sixth Environment Action Programme: pollution and environmental health; greenhouse gas emissions and climate change; ecosystems and biodiversity; and resource use and waste. Within this framework, individual sections cover the key environmental issues and themes in EEA's core set of indicators (CSI):

- air pollution;
- water (water quality and water services);
- climate change;
- biodiversity;
- land use;
- marine and coastal environment;
- waste;
- water quantity.

Each section reviews the policy goals for the issue at global and European levels and in the Western Balkan region. Each section then provides an overview of key trends regarding the state of and pressures on the environment.

Further information on the indicators is provided in the annexes.

Annex I presents an overview of the availability of indicators in the core set for which recent trend and forward-looking data are available, based on the EEA project *Building up of regular environment reporting system according to the EEA core set of indicators for the West Balkan countries* (2008), which gathered data from the countries in the region or from international sources where data have been already reported, together with previous EEA projects in the region.

Annex II presents assessments of past and present trends for all core set indicators where data are available, as well as forward-looking assessment, where data are available. However, forward-looking trends should not be regarded as predictions as there are various uncertainties concerning how these trends might unfold in the future. This provides options for alternative scenarios. Some of them are discussed in this report; but for many key issues this has not been possible.

1.1 Pollution and environmental health: air pollution

Key messages

Industry and motor vehicles are important sources of air pollution emissions in the Western Balkans. In some countries of the region, continued use of leaded petrol and high-sulphur diesel exacerbate motor vehicle emissions. Ageing mining, energy and manufacturing plants also generate high levels of air pollution.

As a result, air pollution is a concern in many urban areas and industrial hot spots. Comparable data on urban air quality in the region, however, are not available.

For several key pollutants, including acidifying substances, total regional air emissions have not changed greatly in recent years; national trends have varied (based on estimates prepared for the Convention on Long-range Transboundary Air Pollution (LRTAP Convention). However, national information bases needs improvement for better analyses.

Countries in the region have put in place new air pollution legislation and have worked together on regional initiatives, such as programmes to phase out leaded petrol and reduce sulphur levels in diesel.

Air pollution is a serious problem in much of Europe, in particular in cities and in industrial areas. In the EU, exposure to fine particulates smaller than 2.5 micrometres in diameter ($PM_{2.5}$) is estimated to reduce average life expectancy by eight months. Air pollution also contributes to acid precipitation and to eutrophication of water bodies, often in countries distant from the source of emissions as pollutants are easily carried by the wind. In the Western Balkans, both industry and transport are key sources of air pollution.

This section reviews recent trends concerning emissions of air pollution in the region as well as air quality. The following chapters discuss drivers and production and consumption patterns that will influence regional levels of air pollution in the future. Some future outlooks on pollution and health are provided in Section 5.2.

Policy goals

The World Health Organization establishes guideline limits for outdoor, ambient air levels of four key pollutants: particulate matter (limits for both PM_{10} and $PM_{2.5}$), ozone (O_3), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) ([7]).

The LRTAP Convention establishes a common framework for reducing air pollution emissions at pan-European scale and addressing transboundary impacts such as acid precipitation. Protocols to the Convention set national emission limits on specific air pollutants, such as sulphur, nitrogen oxides and heavy metals. The most recent, a 1999 Protocol signed in Gothenburg, sets emission ceilings for 2010 for four pollutants: sulphur, mono-nitrogen oxides (NO_x), volatile organic compounds (VOCs) and ammonia (NH_3) ([8]). The ceilings were negotiated on the basis of scientific assessments of pollution effects and national abatement options. All the recognised countries of the Western Balkans are parties to this Convention — as yet, however, they are parties to few protocols. For example, only Croatia is party to the Gothenburg Protocol ([9]).

In the European Union, a range of legislation limits air pollution emissions and regulates air quality. For example, EU directives set standards limiting emissions from industrial installations such large combustion plants and waste incinerators. The Directive on Integrated Pollution Prevention and Control requires other industrial facilities to adopt best-available techniques to limit their pollution levels. Other requirements restrict pollution from petrol and diesel motor vehicles. The EU's air quality requirements restrict ambient levels of 12 pollutants; these were updated in the new Air Quality Directive (2008/50/EC) ([10]). As candidate countries, Croatia and the former Yugoslav Republic of Macedonia must adopt this legislation.

Both through the accession process and national initiatives to strengthen legislation, the many of the

([7]) See www.who.int/phe/health_topics/outdoorair_aqg/en for the 2005 update of these guidelines (accessed January 2010). PM_{10} refers to inhalable coarse particles smaller than 10 micrometres and larger than 2.5 micrometres in diameter.
([8]) The Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone.
([9]) www.unece.org/env/lrtap provides lists of signatories and parties to the Convention and its protocols (accessed January 2010).
([10]) Based on information at http://ec.europa.eu/environment/air/quality/index.htm (accessed January 2010).

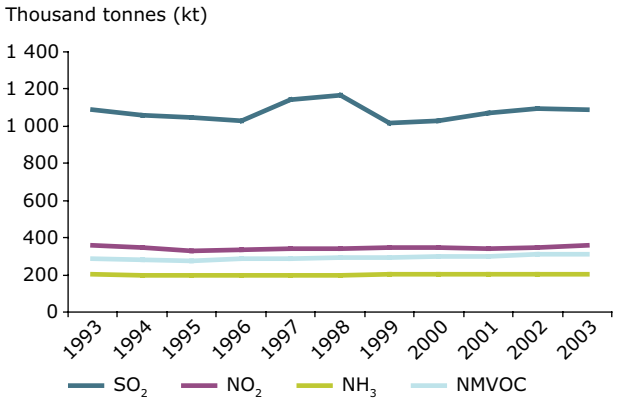
countries in the region are revising and strengthening air pollution regulations. For example, Serbia passed a new Law on Air Protection in 2006 ([11]). Regional initiatives such as the UNEP-based Partnership for Clean Fuels and Vehicles and programmes by the Regional Environmental Centre for Central and Eastern Europe (REC) are working to eliminate leaded petrol from the region, reduce sulphur levels in diesel fuel and improve vehicle standards.

Air pollution emission trends

Bosnia and Herzegovina, Kosovo under UN Security Council Resolution 1244/99, the former Yugoslav Republic of Macedonia, Montenegro and Serbia all use poor quality coal (i.e. lignite) to fire power plants. In Kosovo under UN Security Council Resolution 1244/99, Montenegro and Serbia, metal smelters contribute to high pollution levels. These plants are often near the mines, creating pollution hot spots that also suffer from wastewater discharges and mining waste. Many of these industrial plants have used old production technologies and have poor air pollution control systems.

Motor vehicles are also a major source of air pollution, in particular in large urban areas. In much of the region, many old and highly polluting used vehicles are still in use, many imported from the EU.

Figure 1.1 Emissions of acidifying substances in the Western Balkans, 1993–2003



Source: *Inventory review 2005*, emission data reported to LRTAP Convention; and NEC Directive ISSN 0804-2446.

Fuel quality is often low: in Bosnia and Herzegovina and Serbia, leaded fuel is still used; in some countries, diesel fuel has high levels of sulphur ([12]). These factors exacerbate pollution levels.

For the period from 1993 to 2003, emissions of key air pollutants such as acidifying substances (SO_2, NO_2, NH_3 and non-methane volatile organic compounds (NMVOC)) remained fairly stable (Figure 1.1). Behind this region-wide stability, however, some country emission levels changed significantly. For SO_2, for example, Croatia reduced its emissions by 41 % while those in the former Yugoslav Republic of Macedonia increased by 42 %. For this pollutant, however, the lion's share of the region's emissions came from Bosnia and Herzegovina, Serbia and Montenegro, which together accounted for about 75 % of total SO_2 emissions in 2003 ([13]).

National emission trends in turn reflect a whole series of changing economic and policy trends. In Albania, for example, the decline of industrial production in the 1990s led to a decrease in emissions of SO_2 and other pollutants around Tirana. The increase in motor vehicle numbers and other traffic, however, led to new sources of air pollution ([14]).

Air quality

Air quality is a problem and a threat to health in many regions of the Western Balkans. For example, air quality is poor in major industrial areas such as Pančevo near Belgrade in Serbia, and in mining areas that have nearby metal smelters or coal-fired power plants ([15]). In many urban areas, including Sarajevo in Bosnia and Herzegovina and Tirana in Albania, growing traffic has contributed to declining air quality ([16]).

Further information in this report

The next chapters describe drivers and production and consumption patterns that influence air pollution in the Western Balkans. Chapter 5 presents forecasts of air pollution emissions from the region. There are further details on indicators in Annexes 1 and 2.

([11]) UNECE (2007), Environmental performance review: Republic of Serbia, New York and Geneva.
([12]) Information provided by ETC-SCP.
([13]) *Inventory review 2005*, emission data reported to LRTAP Convention; and NEC Directive ISSN 0804-2446. For some of the Western Balkan countries (Croatia, the former Yugoslav Republic of Macedonia, Serbia) updated data sets until 2007 are available at the European Environment Information and Observation Network (Eionet) as part of the reporting obligations for the LRTAP Convention. However, construction of an update for the regional indicator was not possible due to the lack of updated data for some of the pollutants and the lack of the updates for the other countries in the region.
([14]) United Nations Economic Commission for Europe (UNECE) (2002), *Environmental performance review: Albania, New York and Geneva*.
([15]) UNEP/GRID-Arendal (2007), *Balkans: vital graphics*, Arendal, Norway.
([16]) REC (2006), *Environmental snapshot of south eastern Europe: REReP country profiles*, Szentendre, Hungary.

1.2 Pollution and environmental health: water pollution and water services

Key messages

Freshwater quality varies significantly across the region, which holds both pristine mountain streams as well as rivers polluted by industrial and urban wastewater as well as agricultural run-off. Concentrations of key pollutants, such as organic pollution (measured in terms of BOD, biological oxygen demand) and ammonium, remained largely steady in the first five years of the decade.

In most countries of the region, a high share of the population has access to safe drinking water, according to data gathered by UNDP. The extent of sewerage systems is low. Wastewater treatment is poor or nonexistent in many urban and industrial areas. For some countries, a lack of financing hinders improvements for these water services.

A regional assessment of water quality was obtained only with the indicators calculated with a methodology that is not comparable with the one used for the EU. Data for the assessment on wastewater treatment also have too many gaps to provide an accurate picture; no forward-looking assessment is available.

The availability and quality of fresh water is a global concern. In the Western Balkans, countries share many river basins and water resources, making this an important area for cooperation and concerted effort (i.e. the Danube River Basin Convention 1998, framework agreement on the Sava River Basin 2002, Dinaric Arc Initiative 2008).

Policy goals

The Millennium Development Goals call for halving the percentage of the global population without access to safe drinking water by 2015. This objective has been translated into specific targets for each country, including those of the Western Balkans (these targets are listed below, along with current levels of access to safe drinking water). In addition, many Western Balkans countries also have targets to improve their treatment of wastewater.

The European Union has a broad range of water legislation capped by the Water Framework Directive, which calls on Member States to establish integrated water management by river basin and to ensure that all surface water and groundwater meets 'good chemical status' (i.e. low levels of pollution) and 'good ecological status', ensuring healthy ecosystems. In addition, the EU's Urban Wastewater Treatment Directive requires the treatment of wastewaters from all urban areas with the equivalent of more than 2 500 inhabitants, and the Nitrates Directive protects surface waters and groundwater from nitrates, which arise from the use of fertilisers and manure in agriculture as well as from livestock production. The Drinking Water Directive sets standards and requirements for safe drinking water.

Countries in the region are putting in place new strategies and new legislation. For example, in 2008 Croatia approved a national Water Management Strategy (OG 91/08) as well as the corresponding Ordinance on Limit Values for Indices of Hazardous and Other Substances in Waste Water (OG 94/08), which brings in the requirements of the Urban Wastewater Treatment Directive.

Under the UN's Millennium Development Goals, all countries in the region plan to increase access to safe drinking water by 2015.

Freshwater quality

Water quality varies significantly across the region. While quality is good in many mountain streams and in upper reaches of rivers, wastewater from urban areas and industry has polluted the lower courses of several rivers, such as the Sava River in Serbia and the Sitnica River in Kosovo under UN Security Council Resolution 1244/99 ([17]). Mining sites across the region have also contributed to water pollution. Recent incidents have included heavy metal spills from a tailings dam at Sasa in the former Yugoslav Republic of Macedonia; and releases from copper mines in Majdanpek and Veliki Majdan in Serbia, and also from the zinc mine in Mojkovac in Montenegro ([18]).

Agricultural run-off is a problem in many parts of the Western Balkans. Agriculture is the largest contributor of nitrogen pollution to groundwater and many surface water bodies, as nitrogen fertilisers and manure are used on arable crops to increase yields and productivity. During the 1980s, agriculture expanded in most countries of the West Balkan region,

([17]) UNECE (2007), *Environmental performance reviews: Republic of Serbia*, New York and Geneva.
([18]) UNEP/GRID-Arendal (2007), *Balkans: vital graphics*, Arendal, Norway.

leading to an increase of nitrates in water bodies. In the 1990s, conflict and economic crisis reduced the pollution from agriculture, but fertiliser use has increased in recent years (Chapter 4).

Since 2000, water pollution levels have been largely steady. This is the case for concentrations of oxygen consuming substances (measured as BOD_5) ([19]) and ammonium (NH_4+) measured at over 200 river monitoring stations in the region (Figure 1.2).

The average level of BOD_5 recorded in 2006 in the region, 2.43 mg O_2/l, is slightly higher than the average value for EU rivers (2.38 mg O_2/l). On the other hand, average ammonium concentrations in the Western Balkans are much lower. The average concentrations of two other pollutants, NO_3 and phosphorus, in regional rivers have generally remained stable since 2000.

In many locations across the region, groundwater in shallow aquifers is at risk from contamination by agricultural run-off and other sources ([20]). This is a concern as groundwater is an important source of drinking water in many countries: Serbia, for example, obtains 60 % of drinking water from groundwater ([21]).

Drinking water supply and wastewater treatment

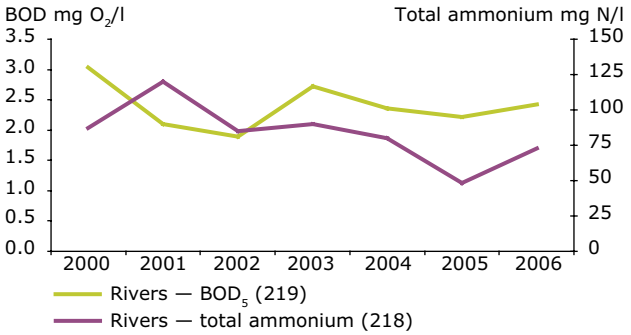
According to UNDP, the share of population with access to safe drinking water varies significantly among the countries of the Western Balkans. However, recent comparable data are not available.

Wastewater treatment in the region is often poor or nonexistent. In Serbia, for example, many large industrial facilities are located at the outskirts of urban areas and discharge their wastewater directly into rivers with little treatment, though total discharges have decreased in recent years. Wastewater treatment plants served only 16 % of the country's population in the middle of this decade ([22]). Albania has one working wastewater treatment plant. In Bosnia and Herzegovina, 90 % of wastewater is reportedly released without treatment. In Kosovo under UN Security Council Resolution 1244/99, there is no wastewater treatment and less than a third of the population has access to a sewer system (a wastewater treatment plant built for Pristina never entered service) ([23]).

A lack of finance for needed investments and maintenance is a common problem. For example, in Bosnia and Herzegovina, water fees are low and governments do not make up the shortfall. Often, collection rates are low as well. Industry faces higher taxes and charges on water use and wastewater treatment — however, the current levels are usually too low to create an incentive for more efficient use and for better wastewater pre-treatment ([24]). In Serbia, few investments were made in water services in the past decade, and facilities deteriorated ([25]).

Croatia has undertaken the construction of several wastewater treatment plants through programmes cofinanced by the World Bank. The recent Adriatic Project and Internal Water Project have a combined value of EUR 385 million ([26]).

Figure 1.2 BOD and total ammonium concentrations in the Western Balkan rivers, 2000–2006



Source: EEA West Balkan project (see Annex 1 for national sources used).

Further information in this report

The next chapters describe drivers as well as production and consumption patterns that will shape freshwater quality in the region in coming decades, as well as improvements in water services. Chapter 5 describes the scale of the challenge for improving water services in coming decades. There are further details on indicators in Annexes 1 and 2.

([19]) BOD, biological oxygen demand, is an index of the degree of organic pollution in water.
([20]) World Bank (2003), *Water resources management in south-east Europe: volume I—issues and directions* (work in progress for public discussion), Washington DC.
([21]) UNECE (2007), *Environmental performance reviews: Republic of Serbia*, New York and Geneva.
([22]) UNECE (2007), *Environmental performance reviews: Republic of Serbia*, New York and Geneva.
([23]) Regio*nal Environmental Center (2006), Environmental snapshot of south eastern Europe: REReP (Regional Environmental Reconstruction Programme for South East Europe) country profiles, Szentendre, Hungary.*
([24]) Speck, S. (2006), *Financial aspects of water supply and sanitation in transboundary waters of south-eastern Europe*, Report for the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. (available at www.bmu.de/files/pdfs/allgemein/application/pdf/financial_aspect_water_investment.pdf [accessed January 2010]).
([25]) UNECE (2007), *Environmental performance reviews: Republic of Serbia*, New York and Geneva.
([26]) Croatian Environment Agency, September 2008.

1.3 Ecosystems and biodiversity

Key messages

The countries of the Western Balkans are rich in biodiversity, due in part to the region's variety of geography and habitats (which includes some specific ecosystems, i.e. karstic regions with rich underground biodiversity and old tectonic lakes (especially fauna and flora) still need to be researched more in detail).

A series of factors have threatened the region's natural wealth in recent years, including urban sprawl, agricultural land abandonment, loss of wetlands due to irrigation, hunting, overfishing and illegal timber cutting and fragmentation of habitats. While many of these pressures are also seen in the EU, the rate of change and scale of impacts is however greater in the Western Balkan countries due to the effects of integration with the EU and economic restructuring as well as the legacies of war.

Countries in the region have taken steps to protect biodiversity and natural areas: notably, the extent of protected areas in the region has grown steadily in recent years; and new initiatives to protect crossborder ecosystems are under way. However, EU legislation and other international regulations are insufficient. National regulation has a key role, but many endemic species are inadequately protected. As a result, the countries are unlikely to meet the European goal to halt biodiversity loss by 2010.

The biodiversity and ecosystem information base (including forests) for the assessment is very dispersed and data are often incomparable. There is also an urgent need for more scientific research on important specific ecosystems in the Western Balkans (karstic ecosystems and old tectonic lakes), and for linking this to policy-making.

The Western Balkans is one of the richest parts of Europe in terms of biodiversity. It encompasses a variety of geographic areas, from the Adriatic Sea and coastal zones to the hills and peaks of the Balkan Mountains and overthe Dinaric Karst to the Danube, Drava and Sava river plains. The region is influenced by Mediterranean, continental and mountain climates. The countries of the region enjoy a great variety of natural habitats, ranging from coastal lagoons and wetlands to Mediterranean forests, freshwater wetlands, karstic terrain ([27]) and mountain forests.

Many ancient tectonic features host endemic water, terrestrial and underground habitats, and these are important for protection also from the wider European perspective. Freshwater fish are of key importance regarding diversity on a European scale. The region's small farms tend to use low levels of pesticides and other inputs, creating extensive, high-nature-value farmland. Extensive forests and pristine natural areas also preserve biodiversity. The region's natural wealth provides a series of benefits, including forests that provide timber and watershed regulation, game for hunting, wild food, medical plants and natural areas for recreation and leisure. The region thus provides a 'green lung' for Europe.

Policy goals

The Convention on Biological Diversity provides a global framework for the protection of biodiversity, its sustainable use and an equitable distribution of benefits from genetic resources. All the recognised countries in the region are parties to this Convention. In 2002, all the Parties to the Convention committed themselves to achieve a significant reduction in the rate of biodiversity loss by 2010, at global, regional and national levels. This target was endorsed at the Johannesburg World Summit on Sustainable Development and incorporated in the UN's Millennium Development Goals.

At pan-European level, the Kiev Resolution on Biodiversity, adopted at the 2003 Environment for Europe Conference, calls for a halt to biodiversity loss by 2010. The European Union has also set the goal of halting the loss of biodiversity in its territory by 2010. The EU protects species and habitats through the Birds and Habitats Directives, and it has set up the Natura 2000 network of protected areas across Member States — legislation that candidate countries in the Western Balkans are adopting.

([27]) Kars is a terrain usually characterised by barren, rocky ground, caves, sinkholes, underground rivers, and the absence of surface streams and lakes. It results from the excavating effects of underground water on massive soluble limestone. The term originally applied to the Karst, a limestone area on the coast on the North Adriatic Sea, but has been extended to mean all areas with similar features.

Governments in the region have taken other recent steps to strengthen biodiversity protection. Many have recently expanded their networks of protected areas and have set targets to continue these efforts: for example, Serbia and the former Yugoslav Republic of Macedonia have set targets to protect 10 % and 12 % of their territory respectively by 2010.

Threatened and endangered species

The countries of the Western Balkans have a wealth of animal and plant diversity. The density of species listed in the Red List of Threatened Species (by area) is two to four times larger than in the 15 older European Union Member States (this refers to the number of threatened animal species, bird species and fish species ([28]).

Many of species are endemic. For example, analyses of fish species in the EU, Western Balkans and Turkey ([29]) show that many are found only in one country. Among these:

- 14 freshwater species are found only in Albania;
- 9 freshwater species are found only in Serbia and Montenegro;
- 4 freshwater species are found only in Bosnia and Herzegovina.

Albania, for example, has an estimated 3 250 higher plant species, about 30 % of the European total, as well as 756 vertebrate animal species. The number of known species in Croatia is around 38 000, though some estimates suggest that the number could be much higher (over 100 000 species).

In Croatia, where a Red List of threatened species has been prepared, about 13 % of marine fish species and 47 % of freshwater fish fall into this category. Over 17 % mammal, 24 % reptile and 30 % amphibious species are threatened, and just over 42 % of the vascular plants species ([30]). The former Yugoslav Republic of Macedonia does not yet have a Red List — however, according to estimates based on existing sources over 10 % of flora species and almost 30 % of vertebrate fauna species are considered threatened.

Further region-wide assessment is needed, as many species are found in more than one country, but data categories and methods differ between countries.

Karstic ecosystems and old tectonic lakes need further investigation to establish the present status of their biodiversity. More generally, data are neither complete nor consistent across countries.

Pressures on biodiversity

The region's biodiversity and natural habitats have faced a series of threats, including habitat fragmentation or destruction, over-harvesting, illegal logging, deforestation, inappropriate management methods, unregulated development and unregulated exploitation of natural resources. In coastal zones, tourism construction has affected both marine and land habitats (Section 1.6). Urban sprawl has been another threat to natural areas (Section 1.5) as well as proposed energy investments (the Western Balkan countries are rich in water resources and building new hydropower plants can endanger biodiversity; another threat is also wood cutting for biomass production).

Other threats include mining, which has altered landscapes and created pollution hot spots (Chapter 3). Forests have been cut back and wetlands drained for agriculture in Vojvodina, in Serbia, as well as other parts of the region. Unregulated hunting is a problem in several countries, including Albania, the former Yugoslav Republic of Macedonia and others. Unregulated logging for timber and fuel wood has damaged forests in many parts of the region, including Kosovo under UN Security Council Resolution 1244/99 ([31]), Montenegro and Albania. In the 1990s in particular, poverty drove some hunting and logging pressures (see Box 1.1). Thus, extraction of the region's rich natural resources has harmed its biodiversity.

There are also other growing biological pressures on species, such as the introduction of alien species through aquaculture and ballast water from maritime transport and the stocking of rivers and lakes with fish for recreational angling: the latter can pose a risk to ecological quality of water bodies.

Protected areas and other actions

Since the mid-1990s, countries across the region have taken action to protect species and habitats, notably

([28]) *Background paper on biodiversity, economic restructuring and quality of life in respect to EU enlargement 2004*: Estonian Institute for Sustainable Development; SEI-Tallinn (Stockholm Environment Institute Tallinn Centre); Institute for Sustainable Development Poland, Centre for Environmental Studies, Hungary; Institute for Water of the Republic of Slovenia, 2003.
([29]) *Ibid.*
([30]) Data provided by Croatian Environment Agency, September 2009.
([31]) Regional Environment Center, *Environmental snapshot of south eastern Europe: REReP country profiles*, Szentendre, March 2006.

by increasing the share of territory designated as protected areas. The total for all countries reached about 9 % of the region's total surface area in 2007 (Figure 1.3). However, urgent actions are still needed to ensure an adequate conservation status for all endemic species; further support for scientific research is needed to better understand the rich biodiversity in specific ecosystems ([32]).

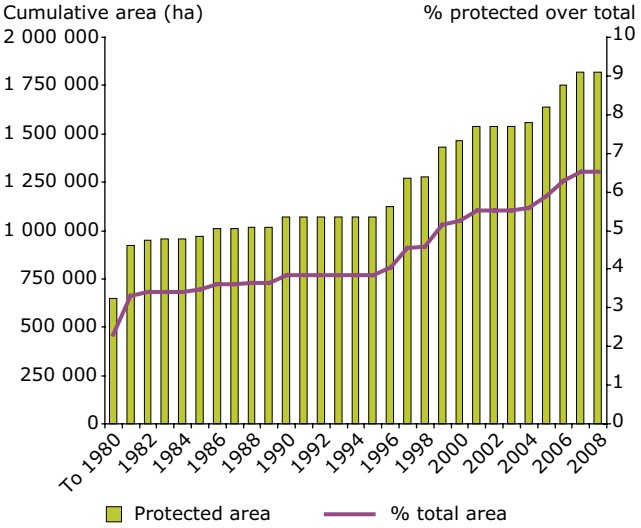
Albania in particular has increased the number and size of its protected areas, which now cover over 10 % of national territory, the highest level in the region. In Croatia as well, the number of protected areas has increased significantly since 1991. Serbia has increased its share of protected areas more slowly, reaching 6.3 % of the territory in 2007.

Countries have taken other steps to manage and protect biodiversity. For example, Croatia has developed national action plans for its large predator species: the wolf, lynx and bear.

Hopefully, some international initiatives will strengthen the cross-border protection of nature and biodiversity. One is the proposal for a legal framework for the protection and sustainable development of mountains areas in south-eastern Europe.

A number of cross-border initiatives have been launched by local and international organisations. These cross-border projects focus on resolving concrete problems and have led to an improved level of communication among project partners and stakeholders, better cooperation and local ownership and commitment. Examples include the Peace Parks (Bulgaria and Serbia) and the Dinaric Arc Initiative. The latter encompasses the whole area facing the eastern Adriatic Sea, from Trieste in north-eastern Italy to Tirana in Albania. It includes portions of the following countries: Italy, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Serbia, the former Yugoslav Republic of Macedonia and Albania. Another initiative is the European

Figure 1.3 Cumulative national designated areas over time in the Western Balkans until 2008



Source: EEA West Balkan Project (see Annex 1 for national sources used).

Box 1.1 Illegal timber cutting in the Western Balkans

One environmental impact of poverty in the 1990s was an increase in illegal logging, which the World Bank has warned is threatening forests in Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Serbia and Montenegro. According to one estimate, about 25 % of timber cutting in the former Yugoslav Republic of Macedonia is illegal: this timber is used mainly for fuel.

Albania has seen logging in forests and in its national parks, including the Lura and Valbona National Parks in the north of the country. Here too, the main demand is for fuel for poor rural families and export. Logging is believed to have decreased in recent years. In Montenegro, illegal logging is carried out both for fuel and for commercial purposes.

Source: European Forest Institute (EFI) and Danish Forestry Extension (DFE), *Study on the issues of illegal logging and related trade of timber and other forest products issues in Europe* (for The Ministerial Conference on the Protection of Forests in Europe — LU Warsaw), 2005.
WWF/UK, *Illegal Logging: cut it out! The UK's role in the trade in illegal timber and wood products*, January 2007.
WWF/UK, *Failing the forests: Europe's illegal timber trade*, 2005.
Papers for the Joint UNECE/FAO (Food and Agriculture Organization) workshop on illegal logging and trade of illegally-derived forest products in the UNECE region: causes and extent (16–17 September 2004, Geneva, Switzerland).

([32]) *Background paper on biodiversity, economic restructuring and quality of life in respect to EU enlargement 2004*: Estonian Institute for SD, SEI Tallinn, Institute for SD Poland, Centre for Environmental Studies, Hungary, Institute for Water of the Republic of Slovenia, 2003.

Green Belt, an IUCN (World Conservation Union) proposal to create the backbone of an ecological network running from the Barents Sea to the Black Sea. The South East European network of Important Plant Areas has been established as a focal point for contributions to the European Plant Conservation Strategy, and it covers Albania, Bulgaria, Croatia, the former Yugoslav Republic of Macedonia, Montenegro and Serbia (including Kosovo under UN Security Council Resolution 1244/99).

Despite these advances, major challenges remain. In Albania, a lack of resources has limited the effective management of newly protected areas ([33]). Across the region, it will be important to integrate protected areas into broader land-use planning and management. In many countries, forest management practices and development plans need to better incorporate biodiversity protection. There is lack of monitoring systems and methodologies to evaluate the status of and impacts on biodiversity.

Further information in this report

The next chapters describe drivers and production and consumption patterns that influence biodiversity in the Western Balkans. Chapter 5 summarises how these may affect ecosystems in the region. There are further details on indicators in Annexes 1 and 2.

([33]) REC, *Environmental snapshot of south Eastern Europe: REReP country profiles*, Szentendre, March 2006.

1.4 Greenhouse gas emissions and climate change

Key messages

Greenhouse gas emissions from the region increased rapidly in the first years of this decade, though on a per capita emissions remain lower than the EU average.

Croatia has a target to reduce its emissions under the Kyoto Protocol. Countries have also set up region-wide forums for climate change.

There is lack of recent, comparable data from the Western Balkan countries on greenhouse gas emissions, and this has limited the analysis.

Climate change is a global challenge that will affect the economy, society and environment in coming decades. For the countries of the Western Balkans, addressing greenhouse gas emissions and adapting to climate change impacts will be an important challenge in coming decades.

Policy goals

At the global scale, international responses to climate change have been taken under the UN Framework Convention on Climate Change. The Kyoto Protocol to the Convention sets binding targets on advanced economies for reducing greenhouse gas emissions. For the EU-15, this target is an 8 % reduction for the five-year period 2008–2012 compared to 1990 levels. One country in the Western Balkans, Croatia, is in this group: its target is to reduce emissions by five percent ([34]).

Current international negotiations are seeking to establish new global limits on greenhouse gas emissions for the period after 2012, and these may set new requirements on the countries in the Western Balkans. The European Union is leading the call for greater reductions in emissions. In March 2007, the EU Council set its own targets: a unilateral 20 % cut in emissions by 2020 (compared with 1990 levels) and a 30 % cut if other advanced countries join. Countries in the Western Balkans that join the EU will be affected by these commitments.

Even under the most optimistic scenario for global action to reduce greenhouse gas emissions, the process of climate change is now firmly underway. Thus, countries need to prepare measures to adapt to climate change. The EU published a White Paper in April 2009, outlining policy measures for adaptation to climate change. Countries in the Western Balkans have also started to prepare for climate change. At the Belgrade Environment for Europe Conference in October 2007, ministers from the region agreed to establish a climate change centre in Belgrade. In November 2008, the Regional Cooperation Council in Sarajevo, with the support of the Regional Environment Center in Hungary, adopted a Climate Change Framework Action Plan for Adaptation.

Greenhouse gas emissions

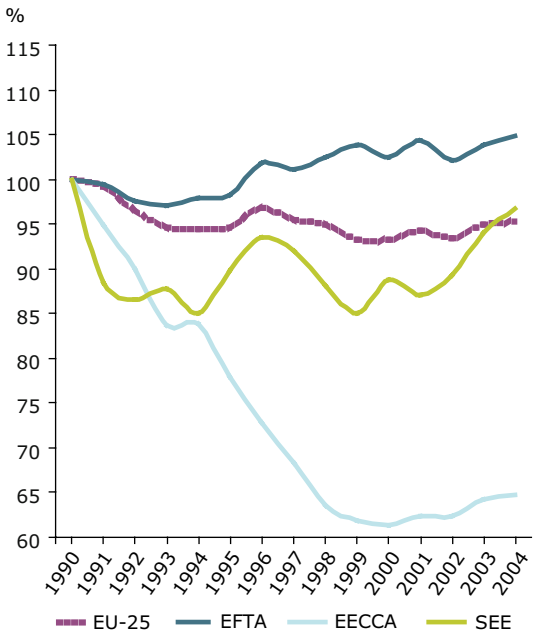
Only limited information on greenhouse gas emissions trends and projections is available from this region (see Annex 1 on the status of national communications). Regional assessment is possible using data from international sources such as the International Energy Agency (IEA) for greenhouse gas emissions from the energy sector and/or results of the GAINS model developed by the International Institute for Applied Systems Analysis (EEA, 2007, *Europe's environment — The fourth assessment*).

A review of data from 1990 to 2004 show that emissions from south-east Europe, an area that includes the Western Balkans as well as Bulgaria, Romania and Turkey, increased from 1999 to 2004, following major declines in the first half of the 1990s (Figure 1.4).

On a per capita basis, greenhouse gas emissions in the region remain below those in the EU-25 (Figure 1.5).

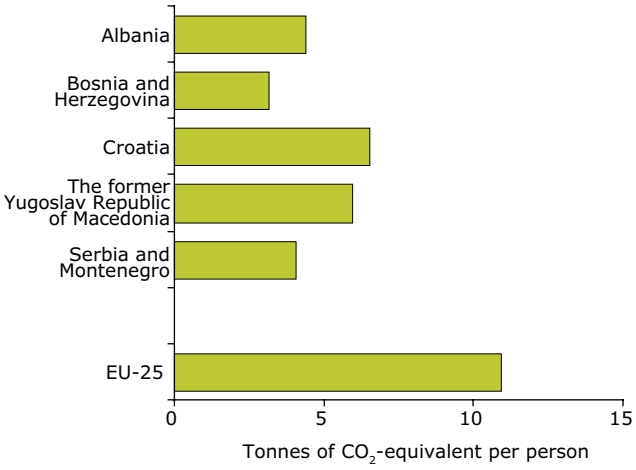
([34]) For further information, see the Secretariat of the UN Framework Convention on Climate Change at www.unfccc.int (accessed January 2010).

Figure 1.4 Trends in total greenhouse gas emissions in wider Europe



Source: EEA (2007), *Europe's environment — The fourth assessment*.

Figure 1.5 Greenhouse gas emissions per capita, 2004



Source: EEA (2007), *Europe's environment — The fourth assessment*.

Further information in this report

In the coming decades, the impacts of climate change will influence agriculture, biodiversity, hydroelectric production and many other economic and environmental sectors in the Western Balkans. The next chapter describes climate change as a driving force for the region's future. The chapters that follow describe two key sectors of production and consumption — energy and transport — that will play a key role in shaping greenhouse gas emissions from the Western Balkans. Chapter 5 summarises issues for the future. There are further details on indicators in Annexes 1 and 2.

1.5 Resource use and waste: land use

Key messages

In 2000, about 45 % of land in the Western Balkans was used for agriculture and a further 40 % was forest. In recent years, however, the proportion of land used for agriculture has decreased and much agricultural land has been abandoned. Another ongoing land-use change has been the sprawl of many urban and coastal areas.

Several countries in the region have introduced new legislation on land-use planning.

The changes in agricultural land use and consequent changes in pollution patterns have environmental impacts on, for example, forest cover and biodiversity. The changes also affect social structures (marginalisation of social groups, different consumption patterns of urban population) and economic development (changes in agricultural production and employment). All of which will be significant for the future sustainable development of the region and the region's role in the wider European area. Specific elements of these trends need further, detailed analysis.

The information base for changes in land use is much weaker than it was in the past. There is also a lack of information on drivers related to land-use change — information that is crucial for analyses of environmental impacts and for the formulation of measures for sustainable development. This needs to be addressed with some urgency.

The landscape of the Western Balkan region includes mountains, major river valleys and wetlands, farm land and forests, and urban and industrial zones. The EU has seen the expansion of urban sprawl in recent decades and this has also happened in. many parts of the Western Balkans in recent years. The abandonment of agricultural land is another problem, particularly in mountain areas.

Policy goals

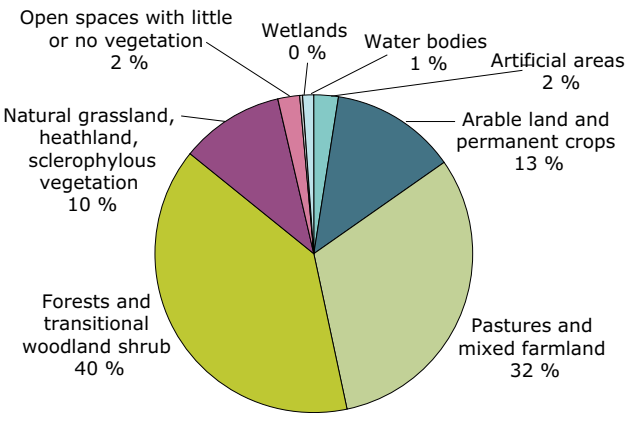
In the EU, the Directives on Environmental Impact Assessment and Strategic Environmental Assessment help to govern land-use changes. In 2006, the European Commission also prepared a Thematic Strategy on the Urban Environment, which called for a reduction in urban sprawl.

Albania, Croatia and the former Yugoslav Republic of Macedonia have introduced new legislation on physical planning and construction to cope with the problem of land take. This allows for legalisation of existing building and has enhanced effectiveness of the planning and permitting system. The reinforcement of legal controls on the development process coupled with the decentralisation of responsibilities to local authorities has already provided some opportunities for better urban management. Nevertheless, more political importance should be given to space planning, as well as to effective integration of biodiversity, natural and cultural heritage protection, and sustainable use of natural resources into all the relevant sectors.

Overview of land cover

Across the region, forests cover 40 % of land territory (Figure 1.6). Forest cover is particularly high in the former Yugoslav Republic of Macedonia, extending over almost 50 % of the country. On a regional scale, pastures and mixed farmland cover a further 32 % of the Western Balkans, and arable land 13 %. Across much of the region, the landscape is diverse and land cover can change in small distances (except for the broad Pannonian plain in the north of Croatia and Serbia, where land cover is more even).

Figure 1.6 Land cover by category in the Western Balkans, 2000



Source: See Annex 2.

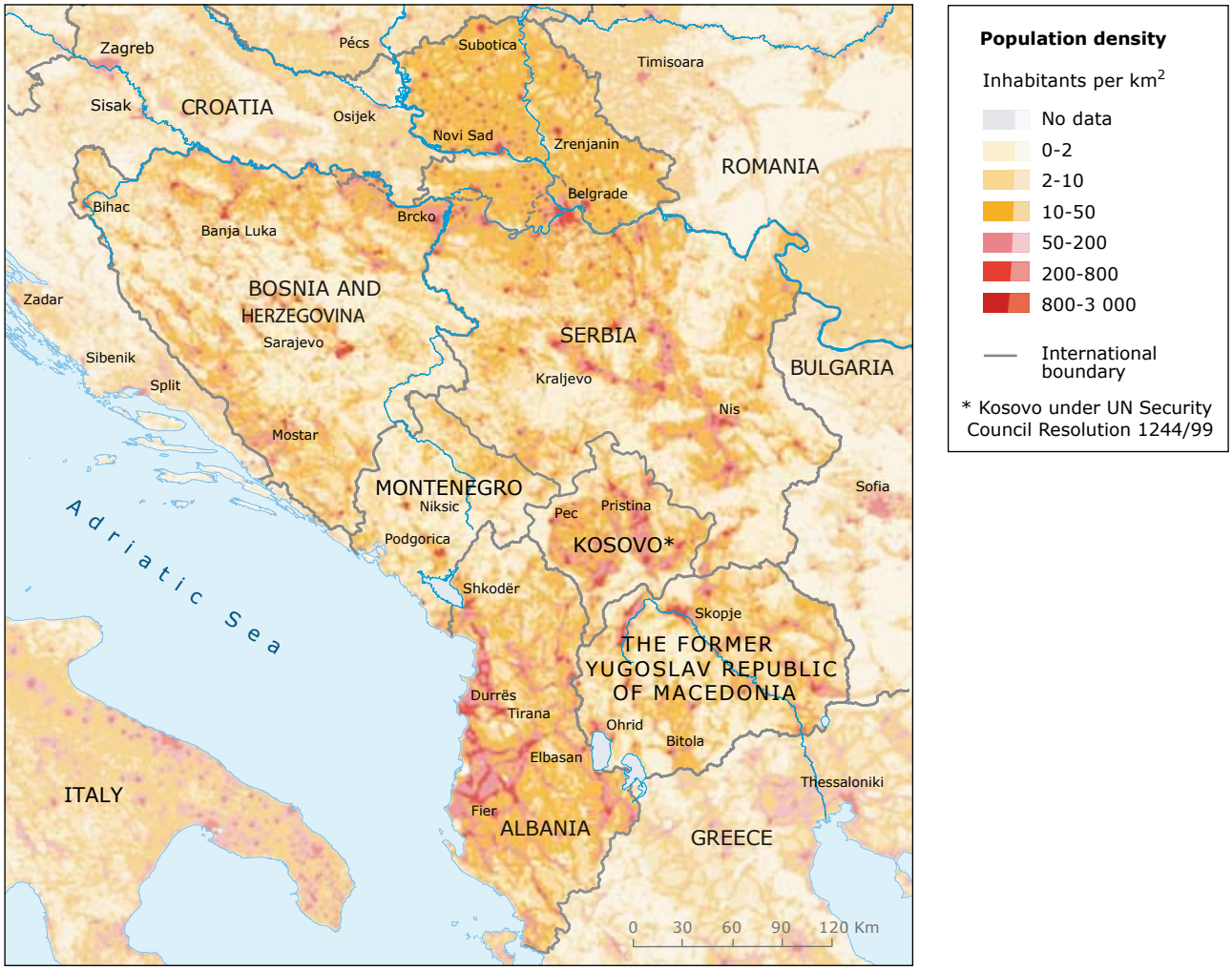
Land cover is uneven across the region. For example, population densities are high on Albania's coast and in its lowlands, in parts of Kosovo under UN Security Council Resolution 1244/99 and also in cities in Croatia, Serbia and other countries (0 below). Mountainous and karstic areas in Bosnia and Herzegovina, Montenegro as well as much of Croatia have comparatively low population densities. Settlements are small and numerous, which means that there are few large unpopulated areas — one of these is the Croatian/Bosnian Dinaric karst.

Recent trends influencing land use

Urban sprawl is one problem that has affected land use in the Western Balkans. In the former Yugoslavia, the wars in the 1990s created major displacements of the population and led to a growth of urban areas. In Albania, strict controls on personal movement and house construction were lifted in the early 1990s, and this prompted a shift in population from rural to urban areas. Many new urban areas have been constructed without planning or permits and without adequate services ([35]).

In Croatia, for example, new urban areas have taken over 4 500 hectares between 1990 and 2000, mostly from mixed farmland and pastures. In Serbia, sprawl has extended over about 4 000 hectares in this period. New residential, service and industrial areas were the main activities that expanded their surface area, followed by transport networks and mines.

Map 1.1 Population densities across the Western Balkans



Source: UNEP/GRID-Arendal (2007), *Balkans: graphic vision.*

([35]) UNDP (2007), *Environmental policy in south-eastern Europe.*

At the same time, land used for agriculture has decreased steadily over the years in most of the countries in the region, and land abandonment has accelerated sharply in recent years. This is particularly problematic in Croatia, which has seen a reported drop of more than 40 % in its agricultural land in recent years. One reason is the conflicts of the 1990s, when many people left their homes (Chapter 2). In Bosnia and Herzegovina, Serbia and Kosovo under UN Security Council Resolution 1244/99, large areas are still contaminated by land mines. Also, land reform measures broke up many large, collective agricultural enterprises, including in Albania, Bosnia and Herzegovina and Croatia. In many cases, the new small farms have been unviable and families have left farming — many have left rural areas for cities, keeping their farmland for security reasons, but leaving it uncultivated. In addition, unclear landownership, poorly functioning leases, incomplete privatisation of land used by former state agricultural companies and a lack of clarity in property laws, as well as outdated land registers have impeded the process of developing a functional land market in some countries, for example Albania ([36]). There is also a lack of clear strategies for the return of refugees, and privatisation has left land ownership uncertain ([37]).

Finally, some agricultural land may have been set aside for the region's growing protected areas (Section 1.3).

The changes in agricultural land use and consequent changes in pollution patterns have environmental impacts on, for example, forest cover and biodiversity. The changes also affect social structures (marginalisation of social groups, different consumption patterns of urban population) and economic development (changes in agricultural production and employment). All of these effects need to be addressed for the future sustainable development of the region and the region's role in the wider European area. Specific elements of these trends need further, detailed analysis.

Further information in this report

Part II and Part III describe drivers as well as production and consumption patterns that will shape land use in the region in coming decades. Chapter 5 presents a Europe-wide outlook for land use. There are further details on indicators in Annexes 1 and 2.

([36]) UNECE (2002), *Environmental performance review: Albania*, New York and Geneva.
([37]) UNDP (2008), *Environmental policy in south-eastern Europe.*

1.6 Resource use and waste: the marine and coastal environment

Key messages

Several pressures affect the environment of the Adriatic and Ionian Seas off the Western Balkans: marine transport of petroleum and natural gas, natural gas extraction in the Adriatic Sea and invasive species. Overfishing is particularly intensive throughout the Adriatic. However, the status of more than three-quarters of the fish stocks has not been assessed yet: here too, there is a lack of information to support accurate analyses.

Coastal areas in the Western Balkans face a further set of pressures that are expected to intensify due to rapid socio-economical changes in the region, such as effluents and solid waste from urban and tourism areas, eutrophication of coastal waters and urban sprawl along coastlines coupled with expected strong increase of turism.

Despite these pressures, the quality of coastal bathing water in the region remains quite good.

Seas and coastal zones hold a wealth of biodiversity and are a source of food, energy and other economic benefits. Marine and coastal environments around the world are facing severe pressures. For example, UNEP reports that 70 % of fish species worldwide are either fully exploited or depleted ([38]). Overfishing as well as high nutrient loads from land-based pollution and risks of oil spills are among the threats to Europe's seas. And across many parts of Europe, sprawl related to tourism development has affected coastal zones.

Policy goals

The Millennium Development Goals include calls for better conservation of marine areas as well as improved fisheries management to reduce the depletion of fish stocks ([39]).

The 1976 Barcelona Convention, revised in 1996, protects the Mediterranean, including the Adriatic and Ionian Seas that touch Western Balkans. The Convention seeks to monitor and control marine pollution, establish the sustainable management of marine and coastal resources and integrate these and other environmental considerations in economic and social development. The Mediterranean Action Plan (MAP) has worked to promote these goals and the sustainable development of the Mediterranean region ([40]). The Adricatic Sea Partnership was signed under this convention in 2006. Several international bodies seek to manage fisheries, including the General Fisheries Commission for the Mediterranean, whose members include Albania, Croatia and Montenegro ([41]).

In 2007, the EU launched a new, Integrated Maritime Policy that brings together its separate actions on fisheries, the marine environment, research, shipping and more. The main environmental component of this new policy is the 2008 Marine Strategy Framework Directive, which calls on Member States to ensure the 'good environmental status' of Europe's seas. Separately, the EU's Common Fisheries Policy seeks to establish sustainable fishing through requirements on annual catch levels, discards, fishing fleet capacities and other measures. A 2002 policy paper calls for the sustainable development of aquaculture in the EU.

Since 2000, Albania, Bosnia and Herzegovina, Croatia, Greece, Italy, Montenegro, Serbia and Slovenia have cooperated on political, economic and environmental issues through the Adriatic-Ionic Initiative ([42]).

Marine environment

Several pressures affect the environment of the Adriatic and Ionian Seas off the Western Balkans. Among the most important are: ([43])

- marine transport of petroleum and natural gas;
- natural gas extraction in the Adriatic Sea;

([38]) UNEP/GRID-Europe, *Overfishing: a major threat to the global marine ecology*, Environment Alert Bulletin 4, August 2004.
([39]) These objectives are part of Millennium Development Goal 7: environmental sustainability. For further information, see www.un.org/millenniumgoals (accessed January 2010).
([40]) UNEP Mediterranean Action Plan for the Barcelona Convention, available at www.unepmap.org (accessed January 2010).
([41]) General Fisheries Commission for the Mediterranean, www.gfcm.org (accessed January 2010).
([42]) Italian Ministry of Foreign Affairs, *Iniziativa Adriatico-Ionico*. www.esteri.it/MAE/IT/Politica_Estera/Aree_Geografiche/Europa/Balcani/IAI.htm (accessed January 2010).
([43]) EEA (2005), *Priority issues in the Mediterranean environment*, EEA Report No 5/2005.

- invasive species;
- overfishing.

These threats come not only from the region's four maritime countries — Croatia, Bosnia and Herzegovina, Montenegro and Albania — but also from economic activities in Italy and from other Mediterranean countries.

Overfishing is particularly intensive throughout the Mediterranean and the Adriatic. In the Adriatic and Ionian Seas that lie off the Western Balkans, the status of more than three-quarters of the fish stocks has not been assessed (Map 1.2). For the few species that have been assessed, the majority face excessive fishing pressures ([44]).

Coastal zones

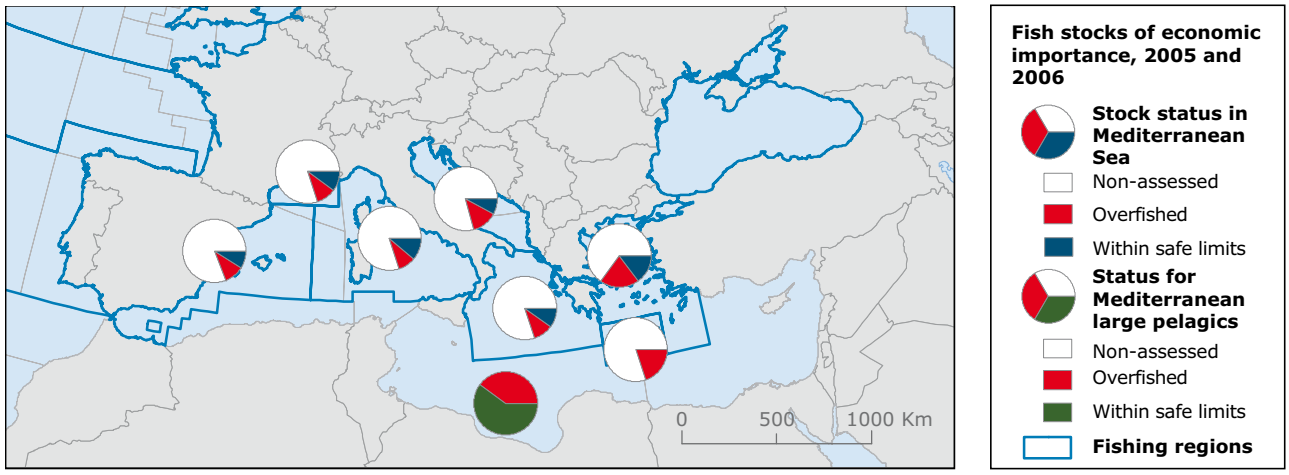
Coastal ecosystems, from coastal land to transitional waters and near-shore marine waters, are 'among the most productive yet highly threatened' ([45]). One reason is that many coastal zones are places of high population density and economic and infrastructure development.

The coastal zones in the Western Balkans have faced a series of pressures. Table 1.1 provides an overview of the problems in three of the coastal countries of the region, Albania, Bosnia and Herzegovina and Croatia (information on Montenegro is not available).

The coastlines of all the countries have been marred by sprawl, with the construction of holiday homes and small tourism developments (see also Section 1.5 on land use), which has damaged ecosystems in coastal land. In addition, inert waste from construction has often been discarded in coastal waters, altering marine ecosystems. In Albania, the process has so far been slower than in the other countries.

The coastlines of all three countries, as well as Montenegro, are affected by inadequately treated urban effluent (Section 1.2). In Croatia, 1 million

Map 1.2 Fish stocks of economic importance in the Mediterranean



Source: EEA (2007), *Europe's environment — The fourth assessment*.

Table 1.1 Pressures on coastal zones in the Western Balkans

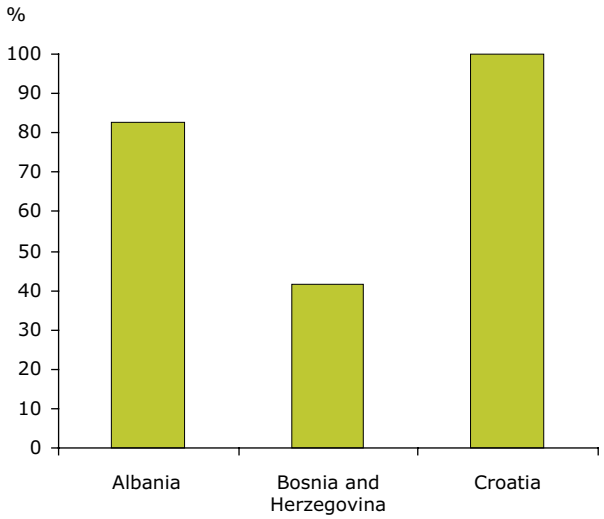
	Urban effluents	Urban solid waste	Coastal eutrophication	Coastal urbanisation
Albania	+	+	+/-	+/-
Bosnia and Herzegovina	+	+	-	+
Croatia	+	+	+	+

Source: EEA (2005), *Priority issues in the Mediterranean environment*, EEA Report No 5/2005.

([44]) EEA (2007), *Europe's environment — The fourth assessment*, p. 223.
([45]) EEA (2006), *The changing faces of Europe's coastal areas*, EEA Report No 6/2006.

people live in coastal areas. In Albania, about 60 % of the country's population of 3 million live in the coastal zone. Montenegro's coastal zone has about 400 000 inhabitants, about two-thirds of the country's total population. Tourism has grown rapidly over the past decade, adding to effluent levels in the summer.

Figure 1.7 Coastal bathing water quality in the Western Balkans, 2005



Source: EEA West Balkan Project (see Annex 1 for national sources used).

Despite these pressures, by at least one measure coastal waters in the region are still relatively clean. In Croatia, for example, almost all the 851 stations report water quality meeting national standards, as do over 80 % of those in Albania, which has 70 stations. In contrast, in Bosnia and Herzegovina, which has a much shorter coastline and fewer stations, most waters do not meet standards (Figure 1.7).

Further information in this report

Part II describes drivers that will shape the marine and coastal environment in the Western Balkans in coming decades. Chapter 3 reviews production patterns, including fisheries; Chapter 4 discusses consumption patterns and covers food consumption. There are further details on indicators in Annexes 1 and 2.

1.7 Resource use and waste: solid waste

Key messages

In recent years, the generation of municipal waste has risen steadily in the Western Balkans, and it is currently estimated to be at levels similar to those in the EU new Member States (however, data on solid waste are poor). Quantities of packaging waste, electronic waste and old cars are growing rapidly, but comprehensive recycling programmes are not in place. Landfill is still the prevailing form of waste management, and illegal dumping of waste remains a major problem.

Municipal waste collection is insufficient in most countries in the region, especially in rural areas. Many waste facilities are old. Abandoned, illegal and poorly managed landfill sites are a problem in many areas.

Both ongoing and accumulated industrial waste, and in particular mining waste, is also a serious problem in some areas.

Countries of the region have updated their waste legislation and developed new waste management plans to address these problems. However, effective implementation of these plans needs better monitoring.

Overall, there is a serious lack of information in this area, which prevents an accurate assessment of the current state and future prospects.

Levels of municipal solid waste are increasing in the EU and around the world, including the Western Balkans. Industrial, construction and mining waste are also growing problems.

Policy goals

At international level, the Basel Convention regulates trade in hazardous waste ([46]).

The EU has an extensive body of waste legislation. The 2008 Waste Framework Directive establishes a hierarchy for waste management, setting waste prevention as the first goal, followed by its reuse and recycling, and reducing the amount of waste sent to landfills. Other legislation sets requirements for waste management facilities, in particular landfills and incinerators, and rules for types of waste, such as hazardous waste and sewage sludge. The EU has also established producer responsibility schemes for specific waste streams, such as electrical and electronic waste and end-of-life vehicles.

In the Western Balkans, most countries have passed new environmental legislation covering municipal waste management, often incorporating principles of EU directives. Countries in the region have also developed waste strategies and legislation for specific waste streams. Implementation and enforcement, however, are a concern throughout the region. Few countries have quantitative targets for municipal waste reduction. However, Croatia's Waste Management Plan for 2007–2015 sets the objective of reducing the quantity of waste currently generated and minimising waste sent to landfills.

Municipal waste: recent trends

The generation of municipal waste per capita in the region is estimated to have increased sharply from 2003 to 2007 — estimated at more than 40 % from 234 to 330 kg/cap (Figure 1.8) ([47]). The increase is linked to the steady increase in GDP over these years — though the growth in waste outstripped the growth in GDP.

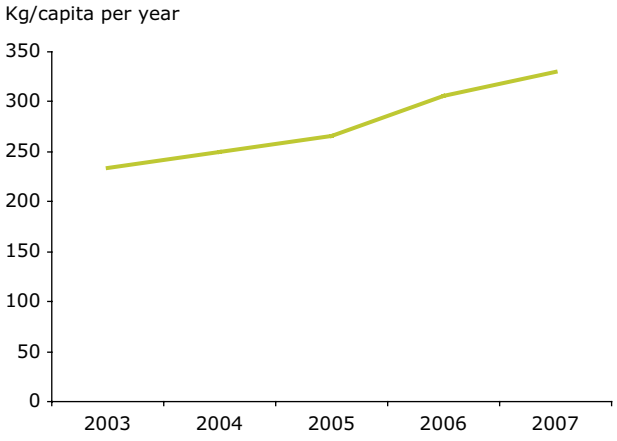
Compared with the EU average of more than 500 kg per capita per year, the figures for the West Balkan countries are considerably lower; however, these levels are quite similar to those in the EU-12, where average municipal waste generation is 344 kg per capita. Municipal waste generation is much higher in the EU-15, mostly because of more wasteful consumption patterns. These comparisons are at best tentative, however, as statistics and information on waste management are not easily available, are often inconsistent and have many information gaps.

Waste management in the region is often weak. Throughout the Western Balkans, municipal waste

([46]) The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal — for further information, see www.basel.int (accessed January 2010).

([47]) These figures are based on estimates and do not cover all countries, so they should be interpreted with caution. Indeed, few municipalities have weighing stations.

Figure 1.8 Municipal waste generation per capita in the Western Balkans from 2003–2007



Source: EEA West Balkan Project. Based on data from Albania, Bosnia and Herzegovina, Croatia and the former Yugoslav Republic of Macedonia ([48]) (see Annex 1 for national sources used).

is mostly sent to landfills, few of which meet high standards such those required by the EU. Waste management services and infrastructure in the region are weak, and the municipal companies that collect waste often use outdated vehicles.

In some parts of the region, municipal solid waste is not collected regularly. While 92 % of the population in Croatia is served by organised waste collection schemes, in Bosnia and Herzegovina, for example, only about 60 % of the population does. Throughout the region, rural areas are generally poorly covered.

Even where it is collected, recycling of municipal waste is not well developed and there are no comprehensive recycling programmes in place. Several categories of waste in particular are reportedly growing rapidly, including packaging waste, waste electronic and electric equipment and end-of-life vehicles. As yet, countries in the region do not have special programmes to address these types of waste. Moreover, many hazardous, industrial and medical wastes are sent to municipal waste landfills, due to the lack of adequate treatment and safe disposal facilities for these categories of waste.

Abandoned waste sites and uncontrolled landfills

Illegal dumping is often a problem, in part due to a lack of waste management facilities. Serbia, for example, has over 160 controlled landfills and over 1 000 uncontrolled landfills ([49]). As a result, landfills pose considerable risks to public health and the environment. A further legacy of environmental problems comes from abandoned, illegal and poorly managed landfill sites.

Croatia has started to tackle these problems, and since 2004 has undertaken the remediation of 292 landfills that did not meet standards. Kosovo under UN Security Council Resolution 1244/99 has also improved several municipal landfills, in particular through support from the European Agency for Reconstruction and other donors.

Industrial waste

Households account for only 7 % of all solid waste generated in the EU (by weight), and only 2 % of solid waste generated in the EU-12. Construction, manufacturing and mining are by far the largest sources: mining generates almost half of all solid waste in the EU-12 ([50]).

Mining waste is a significant problem in many parts of the Western Balkans, as the region is rich in lignite, bauxite, metal ores and other mineral resources. The region has been one of Europe's major sources of metals such as copper, zinc and aluminium. In the 1990s, many of these mines closed, leaving a legacy of unsolved solid waste and other environmental problems such as acid mine drainage that pollutes surface waters and groundwater ([51]).

Further information in this report

Part II and Part III describe drivers as well as production and consumption patterns that will shape waste generation in the region in coming decades. Chapter 5 discusses outlooks for municipal waste generation, using forward-looking indicators for the EU. There are further details on indicators in Annexes 1 and 2.

([48]) Data collection, monitoring and reporting in the waste sector in the region lags behind other sectors with respect to environmental monitoring, for example of water or air. Varying definitions of the concepts and the fact that some countries have reported data on municipal waste and others on household waste have introduced error. Presented municipal waste data are based on rough estimates and should be viewed with caution.
([49]) UNECE (2007), *Environmental performance review: Republic of Serbia*, New York and Geneva.
([50]) Kees Wielenga, FFact, personal communication (March 2009), based on Eurostat data.
([51]) UNEP/GRID-Arendal (2007), *Balkan: vital graphics*, 2007, Arendal, Norway.

1.8 Resource use and waste: water supply

Key messages

While water resources are abundant for much of the year, water scarcity is a problem in parts of the Western Balkans, particularly in the summer, in southern countries, coastal areas and on islands.

The countries of the region share river basins and water resources. In the Danube Basin, including in the Sava River Basin that feeds into the Danube, international cooperation is providing a basis for cooperation for the shared management of river basins and water resources.

The information base is too weak to provide a regional assessment of past trends and of prospects for the use of water resources.

The availability and quality of freshwater is a global concern. In the Western Balkans, countries share many river basins and water resources, making this an important area for concerted effort.

Policy goals

The Millennium Development Goals call for halving the percentage of the global population without access to safe drinking water by 2015. This objective has been translated into specific targets for each country, including those of the Western Balkans (these targets are listed below, along with current levels of access to safe drinking water). In addition, many Western Balkan countries have targets to improve their treatment of wastewater.

The European Union has a broad range of water legislation, capped by the Water Framework Directive which calls on Member States to establish integrated water management by river basin and to ensure that all surface water and groundwater meets 'good chemical status' (i.e. low levels of pollution) and 'good ecological status', ensuring healthy ecosystems. In addition, the EU's Urban Wastewater Treatment Directive requires the treatment of wastewaters from all urban areas with the equivalent of more than 2 500 inhabitants, and the Nitrates Directive protects surface waters and groundwater from nitrates, which arise from the use of fertilisers and manure in agriculture as well as from livestock production. The Drinking Water Directive sets standards and requirements for safe drinking water.

International agreements help to manage river basins in the Western Balkans. The Danube River Protection Convention established the river basin approach to water management for this extensive river basin. Four Western Balkan countries are parties: Bosnia and Herzegovina, Croatia, Montenegro and Serbia. These countries are also parties to the 2002 Framework Agreement on the Sava River Basin, which protects this tributary of the Danube. However, the Dinaric area, which provides for around 30 % of water resources in this area and whose landscape is mostly karstic, is not protected and managed by international or national mechanisms in a sufficient way. A new initiative is under way to fill this gap.

Freshwater water quantities and use

Taken as a whole, the Western Balkans have relatively abundant freshwater resources (Table 1.2) — but in many parts of the region, water is scarce, particularly in summer months. In Albania, for example, although human consumption uses less than 10 % of total freshwater resources, in the summer many rivers carry less than 10 % of their wintertime flow (irrigation uses are particularly significant in the summer: about 49 % of Albania's cropped land is irrigated ([52])). In the former Yugoslav Republic of Macedonia as well, summer river flows are greatly reduced. Although lakes

Table 1.2 Freshwater resources per capita, 2005 (m^3/year)

Albania	8 530
Bosnia and Herzegovina	9 388
Croatia	8 485
The former Yugoslav Republic of Macedonia	2 655
Montenegro	..
Serbia	..

Source: World Bank data.

([52]) World Bank, *Water resources management in southeast Europe—volume I: issues and directions*, 2003.

provide an important water resource in the former Yugoslav Republic of Macedonia, many towns experience summer shortages in drinking water ([53]). In addition, water is scarce in the summer in some coastal areas and on islands.

Countries in the region have also been affected by droughts. Albania, for example, sees large variations between normal and drought years.

Much of the region's water resources are shared: about 60 % of Croatia's territory and over 70 % of Bosnia and Herzegovina's lie in the Danube River basin ([54]). In Serbia, over 90 % of water resources flow from neighbouring countries. The former Yugoslav Republic of Macedonia's main river basins flow through Albania into the Adriatic Sea and through Greece into the Aegean Sea.

Water consumption fell in the region in the 1990s, due in part to conflicts that reduced industrial production and agriculture. These conflicts also led to a decline in farming and a reduction in this sector's water consumption, especially in the former Yugoslavia. In Albania, large state-owned farms that used large quantities of irrigation water were split up at this time, and water consumption fell as a result ([55]).

Institutional, financial and political organisations for water management lack capacity. The involvement of stakeholders is often poor, as is the public transparency of their underlying interests. Additional threats and opportunities are emerging from the region's increasing energy needs, including proposals in new energy policies such as market opportunities for additional hydropower exploitation.

Further information in this report

The next chapters describe drivers as well as production and consumption patterns that will shape water availability, water use and water quality in the region in coming decades. Chapter 5 provides a Europe-wide outlook for water consumption. There are further details on indicators in Annexes 1 and 2.

([53]) World Bank, *Water resources management in southeast Europe — volume II: country water notes and water fact sheets*, 2003.
([54]) www.icpdr.org/icpdr-pages/countries.htm (accessed January 2010).
([55]) World Bank, *Water resources management in southeast Europe — volume II: country water notes and water fact sheets*, 2003.