PART III
CROSSING BORDERS.
EMERGING CHALLENGES AND PERSPECTIVES

EUROPA XXI
Vol. 22/2012

ENVIRONMENTAL PROBLEMS OF THE WESTERN BALKAN REGION AND THE REGIONAL ASPECTS OF TRANSBOUNDARY RISKS

IMRE NAGY

Professor, Faculty of Sciences University of Novi Sad /Serbia
Senior research fellow, Centre for Regional Studies, Hungarian Academy of Sciences/Hungary
Address: 21235 Temerin, Mose Pijade 19. / SERBIA
e-mail: imre.nadj@dgt.uns.ac.rs

Abstract. Environment in the Western Balkan Region is determined by the stage of development, economic structure, burdens of war destruction, stage in approaching and joining the EU and the limits of support. Industrial emissions, mining activities, and the communal waste burdening are key issues among environmental damages in the region which has very dangerous transboundary impact as well. Bilateral intergovernmental cooperation in the field of environmental policy has not been fully exploited among the region states. Cross border and international environmental cooperation and its support (EU IPA Program) have been created to manage water and environmental problems related to divided waters, border rivers and lakes. There is similar cooperation in the coordinated management of cross border protected areas (national parks).
Key words: Western Balkan, cross border cooperation, environment and nature protection,

INTRODUCTION

Western Balkan Region is located in the Balkan Peninsula, south of the River Danube and Drava, and west of Romania and Bulgaria. Regarding its political geography (Croatia and Serbia) the region nevertheless stretches into the Carpathian Basin (the territory of Pannonian Croatia and the province of Serbian Vojvodina), which is entirely different from the rest of the Balkans in its physical geography. In the present study I apply the terminology and definitions used by the Institutions of the European Union, according to which the Western Balkans is defined as Albania and the constituent republics of the former Yugoslavia, without Slovenia. This duality in physical geography results in a number of dissimilarities regarding the environmental features of the region. The predominantly mountainous Balkans in its northern border region, which is the southern edge of the Carpathian Basin, becomes an area of alluvial plains creating flatlands suitable for intensive agricultural activities and thus has developed urban settlements and significant population. Economic differences due to the varied landscape structures result in dissimilar levels of environmental pollution.

NATURAL VALUES

Environment in the Western Balkan Region is determined by the stage of development, economic structure, burdens of war destruction, stage in approaching and joining the EU and the limits of support. EU member state Slovenia has much less problems than soon-to-join Croatia and Macedonia or other states waiting for preliminary negotiations about joining the European Union. Traffic, industrial emissions and the communal waste burdening are key issues among environmental damages in the region. These environmental burdens and problems (mining activities, polluted river waters) have very dangerous transboundary impact of environmental pollution in the Region.

Among natural resources soil, forestry, hydroelectric power, and metal mining have utmost economic significance. Especially agriculture and forestry can be pursued in local farms in Albania, Kosovo and Bosnia. The proportion of cultivated land differs from one region to the other and depends on relief and geological features.

The size of forests is considerable, which proves the importance of forestry and the volatility of forest ecosystems (Table 1). The amount of farmland is decreasing in the area, yet at the same time there is increasing construction in city suburbs due to infrastructural and traffic development. However, degradation from soil erosion is also characteristic. There is no perfect irrigation system where it would be necessary, property ownership and land registers are often unregulated. EU regulations concerning soil conservation and the use of pesticides are not implemented strictly enough except in Croatia and Serbia.

Table 1 Forestry data

	Albania	Bosnia and Herzegovina	Territory of Kosovo	FYR Macedonia	Serbia	Montene-gro	Croatia
Per cent forest area	29	42,7	41	35,6	26,7	53,9	38,2
Deforestation (per cent change, 1990–2005)	0,0	(+) 0,1	No figure, known + rates	0,0	(-) 0,4		(-) 0,1

Source: 2006 Little Green Data Book; EC Progress Reports, 2005; UNECE, 2005; REC, 2006; Kosovo NEAP, 2006.

Forests are endangered by mistaken forestry as well as illegal deforestation especially in Bosnia-Herzegovina and Kosovo leading to soil erosion and loss of flood control as well as it endangers the ecosystem.

The region is rich in endemic species: four times as many endemic species can be found there as in other European regions. The organizational structure of nature protection areas is most developed in Croatia, Serbia and Macedonia, which have been incorporated into the Nature 2000 Network, and their operational principles also harmonize with EU regulations. Although officially the size of protected areas increases some of these areas are yet only planned to go under protection. Thus, the preservation of biodiversity, the development of infrastructure, and the sustainable use of resources in these areas are not settled due to the lack of management and organization. These problems result mostly from the continuing heritage of the 1990s political conflicts as well as the difficulties of economic transition which has not yet given priority to nature protection in Bosnia-Herzegovina, Kosovo and Albania. By the end of the first decade of the twenty-first century, the proportion of protected areas has nevertheless grown significantly compared to that before the change of regime and

the civil war. Among the countries in the region Albania has put the largest territory under protection (Table 2). Several wetland habitats are located in the region, a few of which can be found along the coastline or in border regions, requiring close cross-border cooperation. The number of Ramsar sites in Serbia is 9, 4 in Croatia, 3 in Albania, 2 in Bosnia and 1 site in Montenegro and Macedonia. Furthermore, several wetlands and oxbow lakes are under protection. Such natural values together with the cultural heritage of the region are important as a tourist attractions providing substantial revenues in these states.

Table 2. Increase of protected areas in the Western Balkan Region

	Albania		Bosnia Herzegovina		Croatia		FYR Macedonia		Montenegro		Serbia	
Year	Protected areas (ha)	% in total territory	Protected areas (ha)	% in total territory	Protected areas (ha)	% in total territory	Protected areas (ha)	% in total territory	Protected areas (ha)	% in total territory	Protected areas (ha)	% in total territory
1981	52207	1,88	36730	0,72	240304	2,74	157194	6,11	50870	3,68	174953	1,98
2008	349070	12,58	58931	1,15	747150	8,52	222050	8,64	90870	6,58	542333	6,14

Source: 2006 Little Green Data Book; EC Progress Reports, 2005; UNECE, 2005; REC, 2006; Kosovo NEAP, 2006.

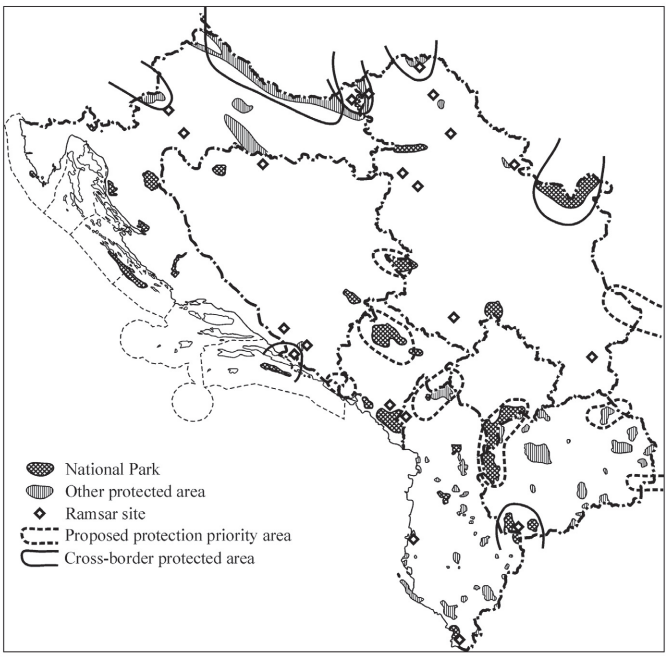

Figure 1. Protected areas in the Western Balkans with special view of transboundary cooperation in nature protection
Source: http://maps.grida.no/go/graphic/protected-areas-and-conservation-hotspots-in-albani http://maps.grida.no/go/graphic/biodiversity_and_protected_areas_in_macedonia; http://www.dzzp.hr/; http://www.eko.vojvodina.gov.rs. modified and expanded by the author

National borders often divide and cut across precious protected areas. In the case of such territories neighbouring countries can jointly develop the measures of protection, and the EU, through its programs, supports various forms of cooperation aimed to resolve such problems. Protected areas stretch across inner and outer borders in the Western Balkans and this fact has prompted cooperation in nature protection. The demand for trilateral cooperation is not rare either, which enables the protection and care of jointly owned nature protection areas in Hungary-Croatia-Serbia or Montenegro-Albania-Kosovo (Figure 1.).

EVALUATION OF THE REGION'S STATE OF ENVIRONMENT

Traffic, industrial emissions and the communal waste burdening are key issues among environmental damages in the region. The source of air pollution is mainly the growing number of vehicles in interstate and inter-region transportation. In Albania emission of nitrogen-dioxide escalated substantially (21%) in 1993-2003. In Macedonia it increased by 17% and in Croatia - 47%, whereas Serbia-Montenegro succeeded in decreasing such pollution - 11% and Bosnia - 14%.

Mainly in Montenegro, Kosovo, and Macedonia air pollution from heavy industry occurs due to the lack of control and use of out-dated technology mainly in metal, energy and chemical industries. Sulfur-dioxide emissions were decreased in Croatia by the turn of the Millennium and Croatia with its new highway network successfully decreased potential tourism-related pollution. In the continental region there are counties that do not even need the monitoring system. Modernized waste management is accomplished in up-to-date regional waste disposal sites. Yet in Macedonia such pollution was still increasing and was eventually stopped in 2003.

Acid rains together with industrial pollution slow down the growth of vegetation yet accelerate the deterioration of built environment. Carbon-dioxide emission per capita is highest in Macedonia, Albania and Kosovo whereas per capita communal air dust is highest in Albania (Table 3). In Albania, Bosnia-Herzegovina and Croatia the amount of emitted CO2 has increased, yet the amount of floating dust has decreased in Bosnia, Serbia-Montenegro and Croatia (EEA, 2010).

Table 3 Air Pollution

	Albania	Bosnia and Herzegovina	Territory of Kosovo	FYR Macedonia	Serbia and Montenegro	Croatia
CO_2 per capita (metric tons, 2009)	1,1	6,9	5,5	5,1	3,7	5,2
Particulates (urban-pop.-weighted avg., μg/m^3) (2009)	44	19	N/A	21	17	30

Source: 2009 Little Green Data Book; Kosovo poverty assessment 2005.

Floating and sedimenting dust emissions, responsible for an increasing number of respiratory diseases, are the result of pollutants occurring from traditional heating in cities and large industrial centres. Air pollution remains an important source of pollution in Macedonia, Kosovo and Montenegro even after the turn of the Millennium. According to forecasts PM10 emission will decrease by 10% in 2000-2020 in the majority of the region's countries. However, the threefold increase of PM10 is forecasted in Croatia similarly to PM2,5 emissions. Earlier these pollution indicators were highest

in Serbia and Bosnia (EEA, 2010). Even though all states in the region signed the Kyoto Protocol there has been little advancement in the field of implementation.

Surface of water and groundwater quality deterioration occurs as a result of the insufficient public sewage system, substandard wastewater treatment and untreated industrial wastewater effluents (Figure 2 and Figure 3). Sewage disposal and treatment do not meet EU environmental norms so EU standardization in this field and related investments will pose a great challenge for all these states. While the sewage problem is partly solved in big cities especially in districts with high population density, in villages wastewater treatment is very much below the standard. In areas where the groundwater is close to the surface nitrate pollution due to intensive cultivation and raising of livestock means a source of danger. Except in Croatia and Serbia water quality monitoring is underdeveloped or completely out-dated, so local authorities are unable to estimate related health risks. The level of service is still low despite the better treatment of sewage in cities.

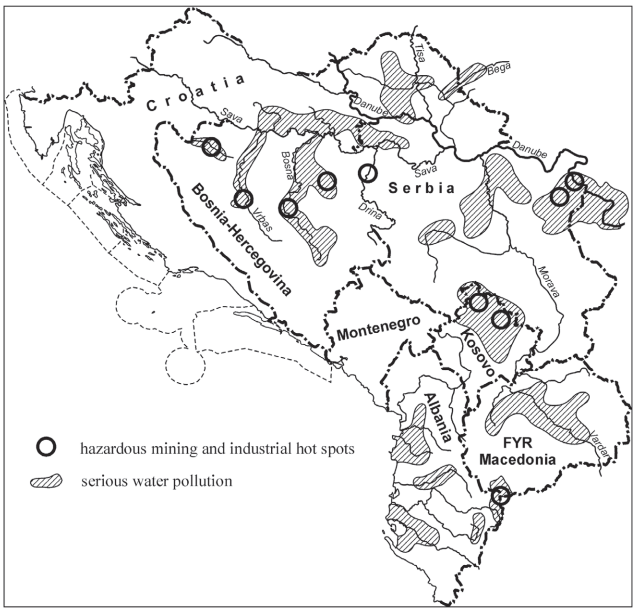

Figure 2 Water pollution sources, the pollution of water and cross-border effects
Source: Identification and verification of "environmental hot spots", Atlas of Eastern and South-eastern Europe 1985–1989, modified and expanded by the author

The sewage system is unevenly developed across the region and in many countryside settlements people gain drinking water from their own wells. Data about water supply are difficult to find especially regarding mountainous areas, moreover political conflicts and the war destruction also slowed down the pace of developing even essential water infrastructure.

The annual per capita amount of communal waste in the region (234 kg in 2003) is growing and by 2007 it reached 330 kg. Such increase is a result of rapid economic growth and the spread of market economy (EEA, 2010).

In Albania deforestation, pollution from urban communal waste management, and industrial pollution are typical state-wide problems. The rapid population growth (40% of the population lives

in seaside cities) could not be followed by communal infrastructure development therefore urban environmental problems are exacerbated by low level of communal hygiene.

Bosnia faces similar environmental challenges, as drinking water supply and sewage disposal are unresolved problems together with waste management. Only half of the cities have organized waste collection, villages entirely lack this service. Thus, illegal waste dumps are frequent along roads and railroads. Industrial zones along the river Bosnia contaminate the river and are sources of continuous air pollution (Zenica, Sarajevo).

Environmental problems in Kosovo are the consequence of the lack of communal infrastructure. Water infrastructure is underdeveloped. Only 44% of the population, 8.4% of village population, has access to tap water. In rural areas water supply is provided from groundwater as well as surface springs, thus the organic and bacteriological pollution of the water reserve occurs frequently. In 2002 the proportion of households connecting to the public sewer system was a mere 28%.

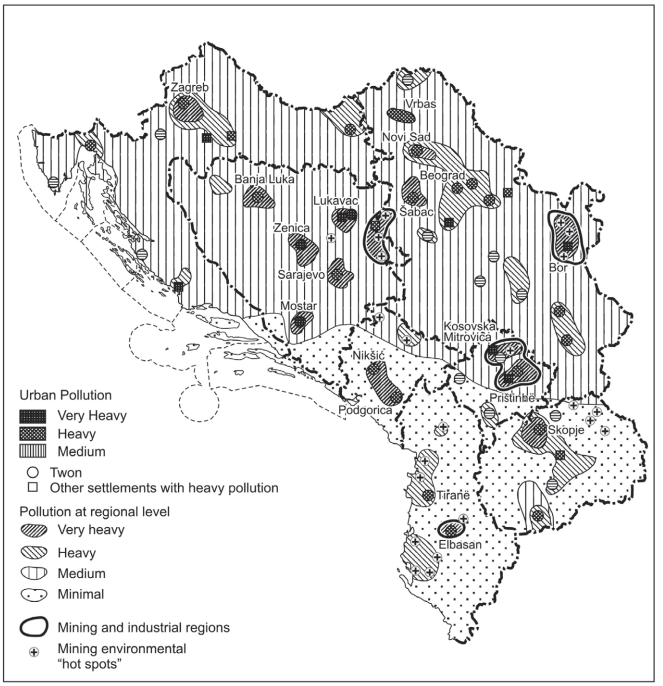

Figure 3 Spatial characteristics of the state of environment in the Western Balkan
Source: Identification and verification of "environmental hot spots", Atlas of Eastern and Southeastern Europe 1985–1989, modified and expanded by the author

In Macedonia surface water contamination is especially significant in the lower Vardar (Category III–IV), Pčinja, Bregalnica, Crna Reka Rivers that flow through densely populated areas. Similarly to other countries in the region such pollution is mainly a result of untreated communal, industrial, and sometimes agricultural wastewater, as only 6% of drained sewage is being treated before it reaches the recipient river.

As far as water quality is concerned in the region it can be stated that the average level of BOD5 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 (EEA, 2010).

The quality of coastal seawater is satisfying despite the impact of tourism and urbanization. There have been significant developments in Croatia to avoid pollution of coastal and surface waters. Croatia has built several wastewater treatment plants with World Bank support. These investments reach EUR 400 million (Adriatic Project, Internal Water Project). Water quality checked at 851 coastal survey- and measuring sites always met national standards.[1]

CROSS BORDER COOPERATION

An UNEP study establishes four basic categories of transboundary pathways of harmful pollutants: 1. airborne transport of pollutants such as dust, smelter emissions, gases, vapours; 2. mass movement of "solid" wastes (generally tailings containing heavy metals and toxic compounds); 3. mass movement of liquid, or semiliquid wastes (again, generally tailings containing heavy metals and toxic compounds; 4. waterborne transport of wastes as suspended solids and as dissolved materials (South Eastern European mining-related risks: *Identification and verification of "environmental hot spots", Lund, Vienna, 2006*). The table below (Table 3.) presents transboundary impacts of pollution according to state, sites of pollution and assessment of its potential cross-border effects.

Spatial aspects of environmental issues in the Western Balkans are defined by the region's natural resource endowments, mining, the different developmental levels of industrial technologies, the dissimilarities in economic development, and the lack of unified environmental policy. Processes of environmental management have been indirectly influenced by earlier historical, demographic, and economic characteristics as well as the civil war of the 1990s. In the spatial structure of environmental risks (on regional and national levels) industrial and mining cities, harbours (Dures, Bar, Split, Rijeka), large tourist centres and capital city conurbations (Beograd, Novi Sad, Sarajevo, Skopje, Zagreb) are the most significant.

Bilateral intergovernmental cooperation in the field of environmental policy has not been fully exploited in the region. Cross border and international environmental cooperation and its support have been created to manage water and environmental problems related to divided waters, border rivers and lakes. There is similar cooperation in the coordinated management of cross border protected areas (National Parks).

[1] In Albania this result was characteristic to 80% of the existing 70 survey and measuring sites, whereas along the mere 17-km-long coast of Bosnia-Herzegovina these norms were met to much less extent, under 50% (EEA, 2010)

Table 3 Transboundary impact of environmental pollution from mining in the Western Balkan Region

Country	Mine Site	Environmental Hazards	Potential Transboundary Harm/ Consequences
Albania	Elbasan Ferrochromium, Fe (steel) Ni mine	Toxic and heavy metal emissions, uncontained and unprotected wastes, residues and chemicals.	Cross border air pollution, pollution of Lake Ohrid shared with FYR of Macedonia Pollution via Shukumbinit River to Adriatic Sea. Tensions with FYR of Macedonia.
	Shkoder Cu mines (incl. Palaj, Karma I and II)		Pollution of Lake Shkodra shared with Montenegro. Tensions with Montenegro, Serbia & Montenegro.
Macedonia FYR	Bucim Cu mine	Toxic/acidic effluents, uncontained waste rock, dust emissions and unsecured workings, poorly contained and/unstable tailings wastes. Toxic solid waste, airborne toxics and SO2, untreated waste	Cross border pollution to Bulgaria then Greece via Nivičanska River, tributary of Strumica then Struma. Danger of political tensions with Bulgaria and Greece.
	Lojane Cr & Sb mine and beneficiation mill		Political tensions with Serbia & Montenegro and Kosovo.
	Kavadarci Fe-Ni and Sb mine(s)		Cross border pollution Greece via Vardar River. Political tensions with Greece.
Serbia	Bor (RTB) Cu mining		Tensions with Romania and Bulgaria due to pollution of downstream Danube
	Krupanj – Veliki Majdan Pb-Zn mine		Cross border pollution to Bosnia-Herzegovina via Drina River (BiH Border). Tensions with Bosnia-Herzegovina.
	Majdanpek Cu mine		Cross border pollution to downstream Danube countries via Pek River, then Danube. Tensions with downstream Danube countries (Romania and Bulgaria).
Bosnia-Herzegovina	Srebrenica Energoinvest Pb-Zn ore mine		Cross border pollution via Drina River (Serbian Border) and into Danube River. Tensions with Serbia and downstream Danube countries (Romania, Bulgaria).
	Birac Zvornik – Alumina Refinery and Aluminum smelter		
Montenegro	Podgorica –Aluminum smelter and refinery		Cross border pollution of Lake Skhodra Political tensions with Albania.
	Brskovo Pb-Zn		Cross border pollution of the Tara River. Political Tensions with Bosnia-Herzegovina.
	Šuplja Pb-Zn		
Kosovo	Djakovica chrome ore mine		Cross border pollution of Albanian border rivers (Erenik River), Lake Fierzës.
	Trepča Pb-Zn mines (Kriva Feja, Rudnik, Zvečan, Kosovska Mitrovica).		Cross border pollution of border rivers in Serbia (Ibar Danube). Cross border air pollution

Source: Reducing Environment & Security Risks from Mining in South Eastern Europe modified by the author.

Table 4. Some examples of Environmental programs and priorities supported by IPA Western Balkans Neighbourhood program

IPA Area	Priorities and supported
Croatia-Bosnia-Herzegovina	- Planning documentation for water supply and water waste systems with cross border impacts; - Joint environmental programming and initiatives: river catchments management, air pollution, - thermal water extraction, awareness campaign targeting industries and general public; - Prevention of natural risks – intervention actions (in case of floods and fire) - Studies and direct actions on applicability of renewable energy sources - Studies on environmental impacts of human activities - Protection and/or preparation of documentation for nature protected areas - Awareness raising activities on environmental management and protection - Education and know how transfer in environmental protection - Clean-up actions in the border area - Promotion of renewable sources of energy
Serbia-Bosnia	- Improving the productivity and competitiveness of the areas' economic, rural and - environmental resources.
Croatia-Serbia	- joint actions to ensure that sites of high environmental and landscape value are managed so that they can sustain the pressures of tourism development without losing their value. - the development of effective systems of flood prevention control - the development of joint waste management and minimisation strategies
Albania-Montenegro	- Part of the Programme is designed to support environmental protection measures, awareness and - respect of environmental aspects focusing in particular at Shkodra/Skadar Lake

Sources: IPA CBC Croatia-Bosnia-Herzegovina Project Summary, http://www.srb-bih.org, IPA CBC Albania-Montenegro, Project Summary 2007-2009, http://www.croatia-serbia.com/

One form of cooperation in the field of environmental protection is the EU IPA sponsored support to protect environment, landscape and biodiversity in cross-border regions. This program enhances and implements local environmental cooperation between areas on both sides of the border with the joint efforts of state and independent organizations, local governments, and environmental institutions.

The CBC programme of IPA supports cross-border projects that call for attention to think together, joint planning and framing these activities. CBC meets multiple goals such as: advertising the activities of environmental protection and nature conservation institutions, protecting cultural heritage sites and disseminating information about them as well as managing the multiple uses of these places, and implementing joint projects in environmental training and know-how transfer (Table 4).

Such joint projects have been devised to spur the protection of the Black Sea-Danube region, the Mediterranean basin or the joint environmental management of lakes (Lake Ohrid, Lake Prespa, Lake Skhodra) among Albania, Macedonia and Montenegro. Similar efforts can be mentioned in connection with border rivers (River Drina, Neretva Delta, River Sava and Drava) as well as related to the coordinated management of Transborder protected areas such as, the mountains of Montenegro and Albania. Similar joint projects are being implemented in the Western Balkans and the neighbouring large regions: the Iron Gates National Park, River Danube between Romania and Serbia, and in the region of the rivers Danube and Drava in the three borders region.

CONCLUSIONS

Analysis of environmental problems in the Western Balkan Region yields the following conclusions:

- The most important sources of environmental burdening include the dead rock deposits, pollutants and hazardous waste coming from the mining technologies of the internationally significant ore mining (lead, zinc, nickel, chrome, bauxite). The "hot spots" of these activities are internationally known and recorded. Due to the location of the mines, pollution from mining spreads across the borders as well, or is a potential pollutant to territories in other countries, thus being a source of international or bilateral conflicts.
- Besides pollution from mining, urbanization generates more contamination through communal living and transportation as it spreads the spatial boundaries of mining damages, and the regional structure of pollution changes.
- Growing tourism causes environmental problems especially in the Adriatic region, overcrowded roads and heavy traffic is an unresolved issue in Montenegro and some Croatian cities.
- Protected areas are managed in compliance with EU regulations (Natura 2000), the directives of their sustainability and infrastructural development have yet to be worked out.
- Management of transboundary protected areas can become more effective through inter-institutional cooperation, which is an existing protocol in states aspiring to join the EU.

BIBLIOGRAPHY

Atlas of Eastern and Southeastern Europe, 1985-1989, Use of the Environment and resultant Problems in Central Eastern Europe – Environmental Problems. Östereichisches Ost- and Südeuropa –Institut, Wien.

Department of Public Information of United Nations (UNDPI), Cartographic Sections New York; National Environmental Action Plan, Synthesis Report, FYR Macedonia, 1997.

Duray B, Mezei I, Nagy I, Pánovics A., 2010, *Environmental Policy and the Institutional System of Environment Protection in the Carpathian Basin*, Pécs: Centre for Regional Studies of the Hungarian Academy of Sciences. (Discussion papers; 79.)

Environmental trends and perspectives in the Western Balkans: future production and consumption patterns, EEA Report No 1/2010

Nagy I., 2011, *Natural resources and state of the environment*. In: G. Horváth, Z. Hajdú (eds.) *Regional Transformation Processes in the Western Balkan Countries*. Pécs: Centre for Regional Studies of Hungarian Academy of Sciences, 2011. 229-255.

South Eastern European mining-related risks: *Identification and verification of "environmental hot spots"*. Prepared as a part of the UNEP Vienna coordinated ADA project: "Improving regional cooperation for risk management from pollution hotspots as well as transboundary management of shared natural resources". Lund/Vienna, 2006.

United Nations Environment Programme, 2000.

Veljković N., Lekić D., Jovičić M., 2008, Case Study of Water Management Processes: Serbian Water Quality Index. *XXIVth Conference of the Danubian Countries* 2-4 June 2008.

Walter G. Steblez, 2003, *The Mineral Industries of the Southern Balkans, Albania, Bosnia and Herzegovina, Croatia, Macedonia, Serbia and Montenegro, and Slovenia*. U.S. Geological Survey Minerals Yearbook, 2003.

Zaštita prirode, međunarodni standardi i stanje u Bosni i Hercegovini, Udruženje za zaštitu okoline, Zeleni – Neretva, Konjic 2008.

http://maps.grida.no/go/graphic/biodiversity_and_protected_areas_in_macedonia

http://www.dzzp.hr/

http://www.bankwatch.org/balkan_energy/# (Balkans Energy Futures, Fossil fuel dependency vs. energy efficiency and renewable energy).

http://www.eko.vojvodina.gov.rs

http://www.srb-bih.org

http://www.croatia-serbia.com/