

Environmental Science

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The Carpathians: Integrating Nature and Society Towards Sustainability



Springer

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Editors

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Preface

The Carpathian Mountains exhibit the same set of conditions that are typical of other mountain regions inhabited by humans for centuries: rich resources, high biodiversity, landscape values, complex history, diverse political and social settings, and opportunities offered by tourism that are confronted with peripheral economic locations and a demanding environment. These issues were presented and discussed during the 1st Forum Carpaticum held in Kraków, Poland, in September 2010.

It was the first of a series of conferences planned in the Carpathian region and initiated by the Science for the Carpathians (S4C): a network of scientists that has been active since 2008, attempting to merge various fields of expertise in Carpathian research and to contribute to the sustainable development of the region. The 1st Forum Carpaticum gathered more than 200 scientists and stakeholders from the whole region, initiating a discussion on vital scientific and practical issues. The 1st Forum was only the beginning, as already in 2012 the 2nd Forum took place at Stará Lesná in Slovakia, and further events are planned as well, including the 3rd Forum Carpaticum 2014 in Ukraine. The large number of scientists interested in participating in these events and those subscribing to the S4C newsletter are a testimony to the growing momentum of Carpathian science. This increase has been caused by a worldwide and European recognition of the value of the Carpathian region, resulting in the amount of research efforts concentrated in this mountain region. Equally important, since the political changes in 1989, scientists from the Carpathian countries have been able to communicate with the global mountain community in a much more open and active way than ever before. In this process, they increasingly take advantage of the long history of science in the region and the vast knowledge that has been gathered there for centuries.

This book is a direct outcome of many excellent presentations and stimulating discussions during the 1st Forum Carpaticum. Our gratitude is extended first to the participants of the event, especially those who submitted their research papers for publication. We would also like to thank all our colleagues who voluntarily reviewed chapters. Invaluable editorial help of Laurie Dunne and Joanna Zawiejska is greatly appreciated.

The 1st Forum Carpaticum was a joint effort of many, especially those involved in the S4C activities. We would like to express our gratitude to all who have contributed to various steps of the S4C development, in particular the former and

present members of the S4C Scientific Steering Committee, members of the Scientific and Organizational Committees of the 1st Forum Carpathicum, and the supporting institutions, including the Mountain Research Initiative—Europe; Institut für Gebirgsforschung: Mensch und Umwelt; and the United Nations Environment Programme Vienna—Interim Secretariat of the Carpathian Convention.

We would like to thank the authorities of the Jagiellonian University and its Institute of Geography and Spatial Management that hosted the 1st Forum Carpathicum. We also thank the Faculty of Forestry, University of Agriculture in Kraków, who prepared the special session on mountain forestry. We would like to acknowledge the support granted by the Director General of the State Forests National Holding in Poland, Regional Directorate of the State Forests in Kraków, the International Visegrad Fund, and the Committee on Geographical Sciences of the Polish Academy of Sciences.

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The Carpathian Mountains: Challenges for the Central and Eastern European Landmark

Jacek Kozak, Katarzyna Ostapowicz, Andrzej Bytnerowicz
and Bartłomiej Wyżga

Abstract The Carpathians are a very distinct mountain chain and a major landscape landmark in the core of Central and Eastern Europe (CEE). The Carpathians are characterized by valuable biological resources and a rich cultural heritage that is of high importance for the Carpathian countries (Austria, Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia and Ukraine). Historically the Carpathian Region has experienced many political changes and conflicts including more than 40 years of communism that restricted development of an efficient pan-Carpathian scientific co-operation. In contrast, the last 20 years allowed remarkable increase in the awareness of the value of the Carpathians for the European society and opened new opportunities for most Carpathian countries after their accession to the European Union. The 1st Forum Carpaticum held in 2010 in Kraków, Poland, is a perfect example of this trend. This book presents a subset of research problems related to the sustainable development of the Carpathian region discussed at the event. Four sections of the book deal with various issues related to abiotic environment, forests and biodiversity, human activities in the region and research methods allowing a better understanding of the past, present and future of the Carpathians.

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1 Geographical Background

Mountainous areas have attracted the attention of scientists for many years, due to their exceptional environmental value, beauty, and a range of services they provide to the communities living in and near them. Mountains have been referred to as water towers of the world and recognized as important hotspots of biodiversity. In addition, these areas are frequently considered as regions that are highly sensitive to global change and thus can be treated as early warning systems to humanity. Currently, mountains worldwide are the target of various national or international programs and policies oriented toward sustainable development. Since the 1990s, these initiatives have increased especially after the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 and the International Year of the Mountains in 2002 (European Environment Agency 2010; Messerli 2012).

Compared to other mountainous areas, the Carpathians are perhaps one of the lowest in elevation, yet a very distinct mountain chain. The Carpathian Mountains occupy the core of Central and Eastern Europe (CEE) and are its most eminent landmark. Hardly exceeding 2,000 m in altitude, they also form the easternmost mountain rampart in Europe before the vast lowlands extending to the Ural and the Caucasus Mountains. There are remarkable differences among regional divisions of this part of Europe: Kondracki (1989) includes in the Carpathians a hilly region in northern Austria and the uplands of Transylvania and excludes the mountain ranges in northeastern Serbia, contrary to the division that is used by the Carpathian Convention (United Nations Environment Programme 2007). Various regional divisions result in area estimates of the Carpathians that differ significantly; for instance, the extent of the Carpathians as estimated by the Carpathian Convention is slightly above 160,000 km² (United Nations Environment Programme 2007), while the area of the Carpathians as delimited by Kondracki (1989) exceeds 200,000 km². There is a general agreement, however, that the backbone of the mountains forms an arc-shaped chain stretching from the Danube River near Vienna to the northeast, then east, southeast, south, and west again to the Danube at the Iron Gate, and further into Serbia (Fig. 1).

The Carpathians are divided among eight CEE countries: Austria, the Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia, and Ukraine, and most of that territory is now within the European Union. The Carpathians occupy a significant part of Slovakia and Romania (71 and 29 %, respectively) and up to 10 % of the territories of other countries. In addition, in the Czech Republic, Hungary, Poland, and Ukraine the Carpathians have a peripheral position; as for Austria and Serbia, various regional divisions may exclude either of these two countries from the Carpathian region.

The Carpathian arc exceeds the altitude of 2,000 m in its northern part, the Tatra Mountains, the highest range of the Carpathians (Gerlachovský štít, Gerlach, 2,655 m), and in the Lower Tatra Mountains (Ďumbier, 2,043 m). Further eastward elevations of the main range decrease below 1,000 m, only to rise again in the eastern section of the Carpathian chain to above 2,000 m, with the culmination in the Rodna

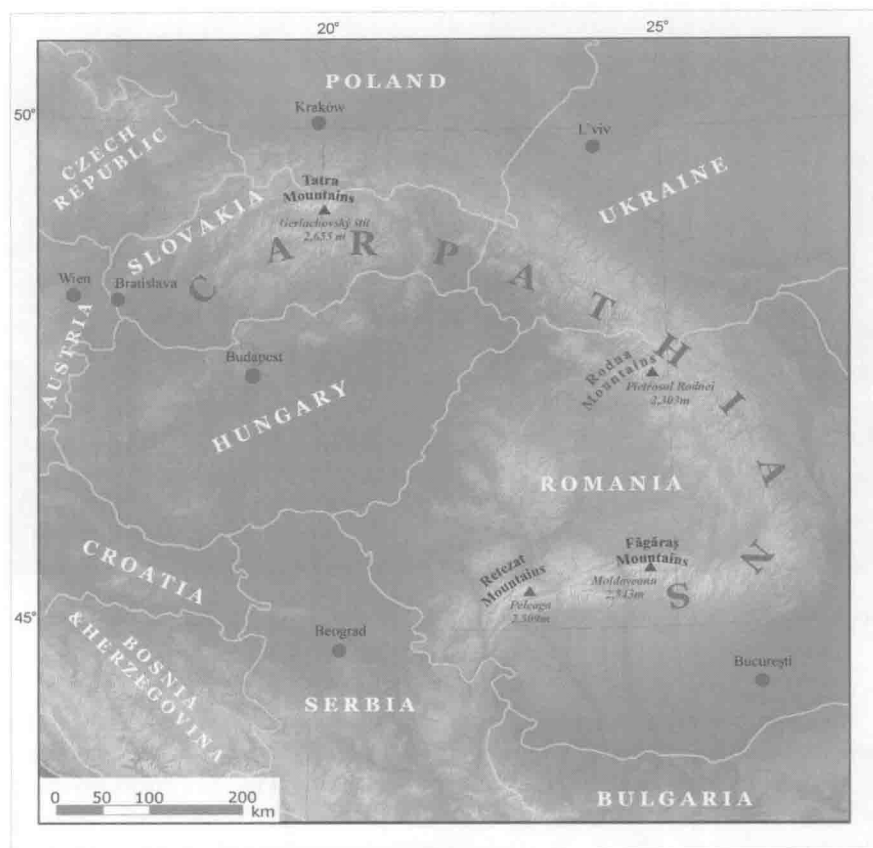


Fig. 1 The Carpathians

Mountains (Pietrosul Rodnei 2,303 m). The Făgăraș and Retezat Mountains in the Southern Carpathians (Moldoveanu 2,543 m, Peleaga 2,509 m) are lower than the Tatra Mountains, yet the area above 2,000 m in the southern part of the Carpathians is 405 km², significantly larger than in its northern and eastern parts (55 and 10 km², respectively). The mountain arc forms an important European watershed divide between the Danube in the south and east, and the Oder, the Vistula, and the Dniester Rivers in the north. The Danube drains most of the Carpathian area: all territory of the Hungarian, Romanian, Austrian, and Serbian Carpathians; almost all territory of the Slovak Carpathians; significant parts of the Czech and Ukrainian Carpathians; and small sections of the Polish Carpathians belong to its drainage basin. The Czech Carpathians are also partially drained by the Oder, the Polish Carpathians mostly by the Vistula, and the Ukrainian Carpathians by the Dniester. In this way, the Carpathians secure water for a number of regions far beyond their boundaries, being an important water tower for most countries of the region.



Fig. 2 Rodna Mountains in Romania (photo credit: Dominik Kaim)

Although several mountain ranges of the Carpathians reach high above the current timberline (1,400–1,800 m), their relatively low elevation does not allow the persistence of glaciers even in the highest locations (Fig. 2). Forests below the timberline (Fig. 3) constitute the major resource of the Carpathians, with the dominance of beech, spruce, and fir. Estimates of the forest cover proportion of the Carpathians vary among various reports, depending on regional delimitations and mountain boundaries. For instance, Kozak et al. (2008) provide a value of 48 % using regional boundaries as found in Kondracki (1989), while the Carpathian Environment Outlook results (United Nations Environment Programme 2007) show a cover of nearly 60 %. Higher up, yet below the timberline, the mountains are almost fully forested: between 1,000–1,500 m a.s.l. the forest cover exceeds 80 % (Kozak 2009).

The Carpathian landscape not only includes a vast “wilderness,” which is typically under the most strict nature protection regime, but also historical, man-made features: a legacy of the rich history of the mountainous area, especially of the advances in agriculture, forestry and social systems in the late eighteenth and the nineteenth century. In this period, the Carpathians constituted the northern, eastern, and southeastern margins of a single political entity: the Austrian and later on the Austro-Hungarian Empire. Hence, the eighteenth and nineteenth centuries were marked by a relative homogeneity of the political and land use system in the



Fig. 3 The Carpathian forest (photo credit: Jacek Kozak)

Carpathian area. The formation of the settlement system and the expansion of agriculture were at its end, and due to social and land reforms, the feudal land systems were becoming a market-oriented economy. This also meant that forests started to be managed as a land resource not directly linked to agricultural activities, leading to major changes in forest composition throughout the area, such as widespread introduction of spruce in the northern and western parts of the mountains. The nineteenth century saw the emergence of a specific land use and land cover patterns in the Carpathians: a mosaic of arable lands, grasslands, and forests, with different proportions of these three components at various elevations. This mosaic was partially erased by collectivization of agriculture in the postwar period in several CEE countries.

Currently, after the privatization of land carried out in the 1990s and 2000s, two major processes threaten the Carpathian cultural landscapes: land abandonment and forest succession on the one hand and urbanization and large-scale investments in the tourism industry on the other (Kozak 2009). While the former increases the naturalness of the mountain region, and to some extent may benefit nature conservation (Fig. 4), the latter can cause numerous societal conflicts and disputes on the allowable and desirable use of the mountain environment by humans (Fig. 5). Regardless of the current trends of land use and land cover change, the diverse Carpathian landscape with a dominance of forests harbors a significant part of European biological resources. In particular, large mammals that have vanished from most of Western Europe are still abundant in the mountains, due to their vast forest areas, and include the brown bear, European bison, lynx, and wolf (United Nations Environment Programme 2007).