

Forest management in the Piatra Craiului National Park between economic benefits and ecosystem services

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Abstract

The Piatra Craiului National Park is located in the Southern Carpathians, preserving one of Romania's outstanding mountain ridges. Its exceptional landscape value is given both by the geologic structure of the Piatra Craiului limestone massif, and its complex forest ecosystem. Unfortunately, on medium and long term the Piatra Craiului National Park is dealing with significant difficulties in attempting to preserve the forest and ecosystem services it provides, despite its legal status as a protected area. This essential ecosystem services offer must counterbalance and even prevail in designing the strategic interest and future management of this natural resource. The study bases on the analysis of the contradiction between the National Park's purpose and objectives, on one hand, and economic interests in the area, on the other hand. It brings arguments and explains the causes that underlie the different forest exploitation on the northern and southern sides. The research methods based on GIS techniques for mapping the time-scale deforested areas, and on semi-structured interviews of the local people. The research results show a continuous increasing of clear cut areas after 2000 in the spruce forest, mainly triggered by the permissive and vague legislation and the mismanagement it has been favouring since then.

Keywords

forest management, clear cutting, ecosystem services, national park, Piatra Craiului, Romania

Introduction

Until 1990, Romania's forests were one of the most valuable forests in Europe due to their structure, floristic composition, species richness, functions and efficiency (UNGUR 2009). Afterwards, a constant degradation and destruction occurred, mainly caused by the recently approved law (Land Rule 18/1991 on forest retrocession to former landowners).

The degradation of forests by abusive logging has increased along with the application of the Rule on return of property rights or Lupu's Rule 1/2000 (UNGUR 2008). Besides the abolition of many state forest districts, giving up forest planning on large forestry units and introducing summary studies have triggered a radical change in forest management (UNGUR 2008). Ordinance 64/2001 provides for the authorization of specialized units (private forest districts) to develop summary planning research (Art. 1). Theoretically, they are designed to create the necessary conditions to ensure proper technical and economic solutions to forest planning works. However, in practice does not ensure its sustainable management (Art. 2).

Destruction of the returned forests became catastrophic after the Rule 247/2005 on reforming the property rights and Ordinance 139/2005 on forest management had come into effect (UNGUR 2008: 183). Retrocession has not been ended any far.

Romania's forests are continuously changing especially due to human activities, but also to climate and other physical factors. For providing a good future, the authorities should mainly consider the allocation of funds „to reduce anthropogenic pressure on forests by granting the small and large landowners in order to reduce illegal logging and provide an adequate forest management” (Ministry of Environment and Forests 2010).

The ecosystem quality of forest derives from its main functions and features: a web of interactions and interdependencies among the parts, synergy, stability, diffuse boundaries and hierarchical structure (PERRY et al. 2008). Forests have the highest biological diversity of all terrestrial ecosystems on land (UNEP 2013). Their value derives from the biological resources they host (Convention on Biological Diversity 2001).

One of the earliest statements regarding ecosystem services was given by COSTANZA et al. (1997) that forests provide humanity with services, as well as goods like food and timber, which derive from ecosystem functions. According to KÖRNER & OHSAWA (2005) ecosystem services are "the benefits people obtain from ecosystems". These could be ecological, economic, social and health benefits (UNEP 2013).

The aim of the study

lies in the analysis of contradiction between the purpose and objectives of the Piatra Craiului National Park and the economic activities in the area. *The main objectives* of the study are: to establish the causes underlying

uncontrolled exploitation of forest resources in a protected area, and the perception of both local communities and authorities on the forest economic and ecosystem services.

Study area

The Piatra Craiului National Park is located in the eastern part of the Southern Carpathians, preserving Romania's most spectacular limestone ridge. The massif came under protection as a natural reserve in 1938 to protect rare plant species, some of which are endemic, such as *Dianthus callizonus* (the current symbol of the park), *Hesperis nivea*, *Minuatia transsilvanica*, *Leontopodium alpinum*, etc. It was declared a national park by the Rule 5/2000 on protected areas. The significant landscape value derives from the geologic structure of the Piatra Craiului Massif, and the complex forest ecosystem.

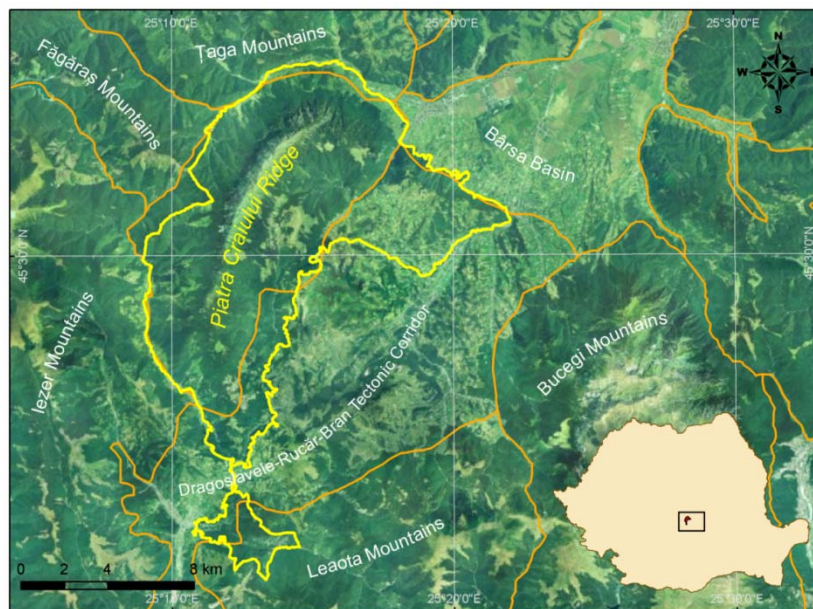


Figure 1: Location map of the Piatra Craiului National Park (orthophotograph – courtesy of ANCPA (National Agency for Survey and Real Estate Advertising))

The exposed rocks of the Piatra Craiului National Park are primarily Upper Jurassic limestone and Cretaceous conglomerate. The massif is synthetically a limestone-conglomerate ridge with a NNE-SSW orientation and 25 km long. Elevation reaches over 2000 m (Piscul Baciului 2,238 m). Its general structure is monoclinical with various inclinations. The southern part is a typical cuesta, whereas the central and northern define a hogback. Strata plunge towards east and south-east, generating a gentler slope, comparatively to the steeper, western scarp slope bordered by continuous talus scree. Forest covers a large area of the park. The main floristic associations are: pure mountain beech forest (*Fagus sylvatica*), mixed forest, pure spruce forest (*Picea abies*) joined by patches of yew (*Taxus baccata*), and isolated pine groups (*Pinus sylvestris*) (IORAȘ et al. 2001).

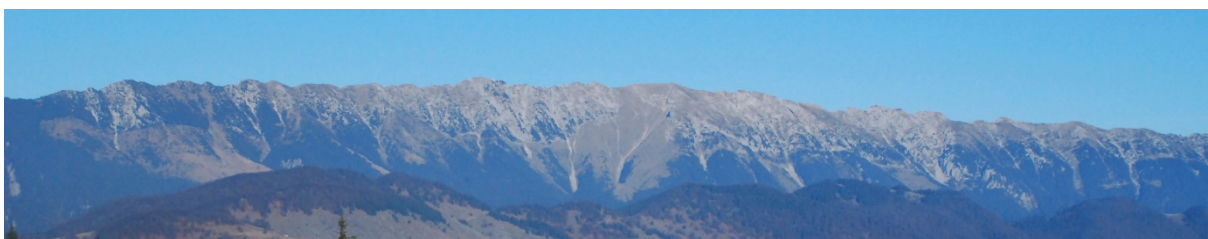


Figure 2: The eastern slope of Piatra Craiului limestone ridge (Photo by Laura Tîrlă, 2008)

Data, materials and methods

The main datasets used in the study enter the following categories: land use and land cover change data (area and percentage); number of respondents; vector data (county and protected area boundaries; settlement boundaries; rivers; roads; different-generation clear-cuttings). Materials used: 2005 and 2009 orthophotographs (courtesy of ANCPA), 1980 topographic map; forest maps for validation. Research methodology is based on both using GIS techniques to identify and graphically represent the deforested (clear cut areas, and investigation (semi-structured interviews). Digital mapping helped to delimit different land cover types (forest, historically and recent deforested areas, bare limestone, settlements, roads, rivers), and boundaries (landforms, counties, national park). Maps superposing was useful in identifying the different time-scale extent of the deforested areas (2000, 2005 and 2009). To understand the perception of local communities on the economic and environmental dimension of the forest, the authors conducted a series of semi-structured interviews during the fieldtrips in July, August and September 2012. The target group included the following socio-professional categories: mayor, priest, ranger,

forestry engineer, teachers, students, local entrepreneurs and farmers. Interviews focused Dâmbovicioara village, the most affected area by forest exploitation.

Results and discussion

In the Piatra Craiului National Park clear cutting was initiated right after the retrocession of the forest areas to former owners had begun, once the following legislation came successively into effect: Rules 18/1991, 167/1997, 1/2000, 247/2005, and Ordinance 139/2005. This permissive legislative has created the favourable framework to extension of uncontrolled logging in the park's area; the most damaged was the pure spruce forest (*Picea abies*).

Consequently, the type of ownership stood behind the differential exploitation of timber in the two counties whose territory the park area extends – Argeş and Braşov. In Braşov County, forest belongs to legal forms of ownership (municipalities, churches). In Argeş County private ownership, which greatly expanded after retrocession, predominates.

Digital mapping allowed pointing out some essential time-scale issues of clear cutting in the area. The high-resolution aerial photographs of 2005 and 2009 were the base imagery we used in this analysis. Until 2000, most clearings resulted by deforestation were very old. An accurate dating of these clearings was not possible; it is only known that they were generated in historical time for the needs of local communities. They represent a consequence of their traditional land use, particularly for grazing. People used timber in households for heating or as a building material. In Braşov County, much of the cleared area was converted to grassland within the household structure.

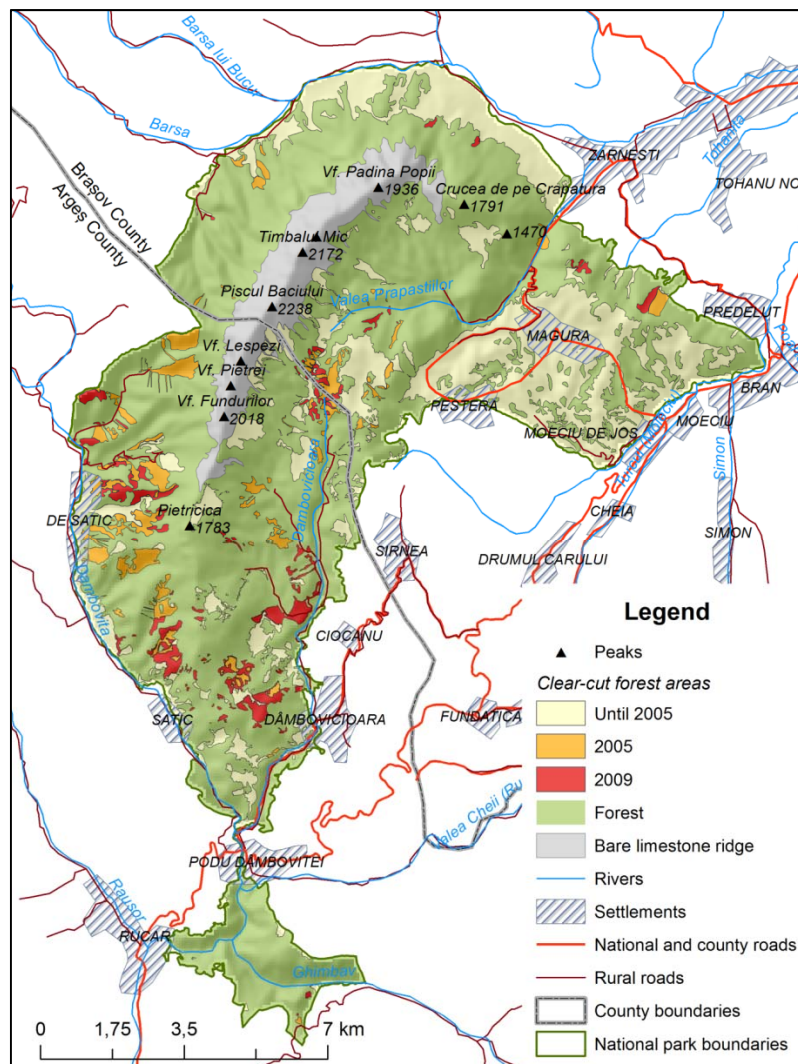


Figure 3: Clear cutting areas in the Piatra Craiului National Park

In 2004 the first summary planning studies made by ITRSC Vâlcea came under approval (Order 64/2001). Then the clear cutting started, complying with the national park status of the area they were practiced. Map in Figure 3 shows a clustering tendency (prevalence) in the upper basins of Dâmbovița River (in the Sătic commune) and Dâmbovicioara, as well as on the steep heads of Valea Prăpăstiilor. Some deforested areas appear isolated in Braşov County, on Bârza Valley and near Predeluț village.

The situation maintained thereafter. The analysis performed on the 2009 orthophotographs allowed identifying other deforested areas within the national park; they usually cluster around the older cuttings, causing a significant extension thereof (Figure 3). This proves that the same land owners continued to clear cut the forest. Deforested areas sum 3.84 km², most of them in Argeş County. Percentage distribution is shown in Table 1.

Overall, the highest rate of deforestation practiced after 2000 record in Argeş County by 81%, and the remaining 19% in Braşov County. Therefore, the forest area within the national park has sequentially decreased from 108.42 km² in 2000 to 104.58 km² in 2005, then finally to 95.31 km² in 2009, losing a total of 12.1%. The detailed results of the mapping analysis are included in Table 1.

Table 1: Land cover change in the Piatra Craiului National Park based on clear cutting area detection

Year	Argeş County		Braşov County		Total clear-cut forest area	
	(km ²)	(%)	(km ²)	(%)	(km ²)	(%)
Until 2005	7.34	22.14	25.80	77.86	33.15	22.43
2005	4.25	78.13	1.18	21.87	5.44	3.68
2009	3.26	84.90	0.58	15.10	3.84	2.60
Total	14.85	35.00	27.56	65.00	42.43	28.71
Total protected area	67.46	45.64	80.35	54.36	147.81	100

Local communities' perception on forest benefits. The results of semi-structured interviews revealed a number of conflict issues regarding the local communities' perception on economically productive and environmentally protective role of forest ecosystems in the Piatra Craiului National Park. Field survey demonstrates that, in respondents' opinion, economic benefits prevail over ecosystem services. A synthesis of the interviewees' perception is shown in Table 2. Most local community members believe that the forest is rather a profitable economic good than a vital source for the sustainable development of human settlements in the studied area. Therefore, the safest way to sustainable forest management in the national park is developing awareness of local communities, including both ordinary citizens and those situated on the highest rungs of social hierarchy (GIURGIU 1995; UNGUR 2008).

Table 2: Local communities' perception on forest benefits (frequent answers)

Economic benefits	Ecosystem services
Fuel for heating homes: <i>firewood</i> ;	Oxygen producing: <i>clean /fresh air</i> ;
Building material;	Aesthetic landscape: <i>beautiful view, "I like the landscape"</i> ;
Timber: boarding wood;	<i>Smell of fir-tree branches("cetină"), fresh scent</i> ;
Berries and edible mushrooms: raspberries, blackberries, blueberries; mushrooms: "mitărci", milky sponges, "ghebe", and "vineciori"; Hunted: deer, wild boars, foxes;	<i>Clear, clean water</i> ;
Herbs: <i>rosehip, hawthorn, rattle, yarrow, and "țintaur"</i> .	Protection against flooding: <i>"It stops the water from taking away our homes, gardens, and fields"</i> ; <i>"No more high waters coming"</i> ;
	Protection against soil erosion and landslides: <i>"It does not let the land go downhill"</i> ;
	Prevents avalanches: <i>"no more snow coming upon us"</i> ;
	Reduces noise: <i>"It is very silent, much tranquillity in the forest"</i> .

(Excerpt from semi-structured interviews conducted in Dâmbovicioara village in 2012)

Conclusions

The permissive and vague Romanian legislation has favoured the chaotic exploitation of national forest, regardless of its status, and the most affected were and still are the forests in protected areas. In the Piatra Craiului National Park, the spruce forest (*Picea abies*) was the most affected. In the two counties where the park area extends (Argeş and Braşov), the type of property form stood behind the different size of timber exploitation.

In 2004 the first massive clear cuttings started, following the approval of the first summary studies of forest planning. These destructive actions are not compatible with the national park legal status of the area. In 2009 the previously clear cut areas extended, which demonstrates that the same landowners practiced further this action.

Overall, after 2000 the highest rate of deforestation recorded in Argeş County (81%), and the remaining in Braşov County (19%). Consequently, the forest area has lost 12.1%.

The results of semi-structured interviews revealed a number of conflict issues regarding the local communities' perception on economically productive and environmentally protective role of forest ecosystems. Most of them believe that the forest is rather a profitable economic good than a vital source for the sustainable development of human settlements in the studied area. This is a warning on the need to raise the local communities' *forest conscience* in order to develop a sustainable forest management in the Romanian national parks.

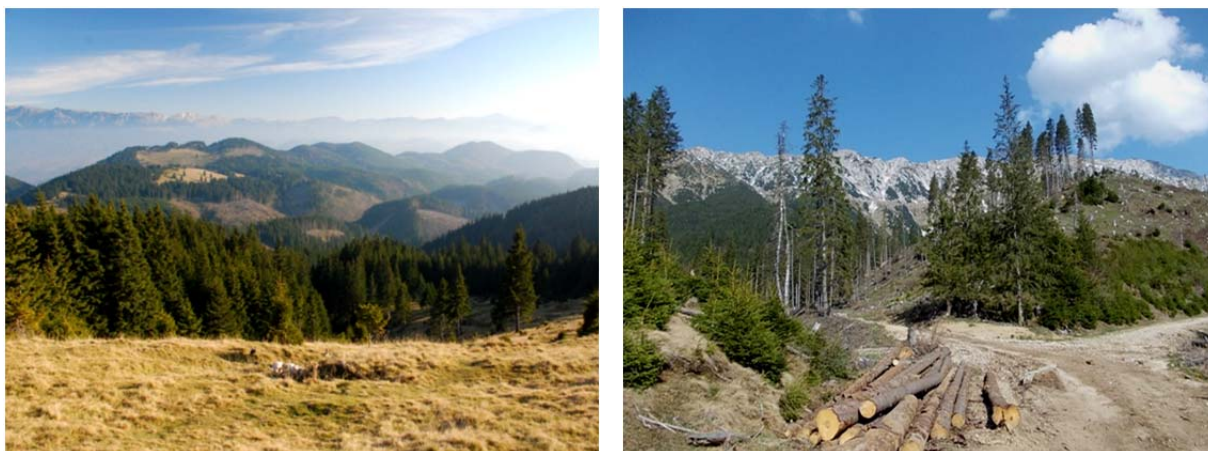


Figure 4: Clear-cutting driven ecological disaster in the Piatra Craiului National Park (2008 and 2012)

Recommendations

- Organizing thematic workshops with stakeholders in the forests social management to raise the local communities' awareness of its role as a „living natural resource” (UNGUR 2008: 295);
- Sensitization on the conservation and maintenance of biodiversity;
- Popularization of practical knowledge accessible to all socio-professional classes (forestry education);
- Projecting educational movies in order to draw attention to ecological disasters in different parts of the world, caused by forest overexploitation;
- Cultural actions to develop the public forest consciousness.

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