ECOLOGICAL ASPECTS CONCERNING THE CHAMOIS  
(RUPICAPRA RUPICAPRA L.1758)  
IN THE CEAHLAU NATIONAL PARK

ADRIAN ALAZAROAEI¹ and IORDACHE ION²
¹Faculty of Biology, “Al. I. Cuza” University of Iasi; e-mail: rupicapra_zoo@yahoo.com  
²Faculty of Biology, “Al. I. Cuza” University of Iasi – department of Zoology-Ecology,  
Str. Carol 11A, 700506 Iasi, Romania; e-mail: ioni@uaic.ro

Abstract. The chamois was introduced in the Ceahlău Massif in 1967-1968. In 1967, four chamois were released in the Durău area, and in 1968, three other in the Poiana Sihastru. They were brought for acclimation from the Retezat Mountains. They found good conditions here and, in 12 years, the number of chamois increased to 40, after 30 years to 84 and, at present, in 2006, we estimate a number of 113 chamois.

Keywords: Rupicapra rupicapra, prospective monitoring, ecological aspect, Ceahlău National Park


Cuvinte cheie: Rupicapra rupicapra; monitorizare, aspecte ecologice; Parcul National Ceahlău

Introduction
The chamois (Fig. 1) is present in specific areas in the Eurasian mountains: Pyreneans, Alps, Carpathians, Balkans, Caucasian, Asia Minor and was also colonized in the mountains of New Zealand. Specialists stated that there are several geographical breeds, and Couturier (1938), in a monograph on the chamois, considered that the Carpathian breed, by its characteristics, could be considered as a subspecies called “carpathica”.

Figure 1. Chamois (original photo).

Along the years, the number of chamois in the mountains changed because of the excessive hunting, poaching, dogs in the sheepfolds, but also because of the lack of any
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protection dispositions.

In the period 1967-1968-1970, the Ceahlău and Hășmaș Mountains were repopulated with 24 chamois brought from the Retezat Mountains. In 1967 and 1968, 7 individuals were brought and placed in closures at Durău and Poiana Sibiului. After a period of acclimation, they were released and constitute the centre of the population that exists in the present.

Their number increased quite rapidly, so that, ten years after bringing chamois in the Ceahlău region, there were 40 individuals, and after another 20 years, there were 84 individuals. In the present, the chamois population is estimated at 113 individuals.

By its relief in steps, the Ceahlău Massif offers multiple possibilities for the living of chamois.

The upper part, with an altitude of about 1900 m is like a wide back, where we can see the Toaca Peak, like a pyramid, and the Panaghia Peak, like a huge tower. The Southern part is dominated by the Ocoleşti Mare Peak, with an altitude of 1911 m, like a pillar. In the South-Eastern area, there is a secondary plateau, called Ocoleşti Mic that is limited by steep walls in the rocks called Turnul lui Budu (“Budu’s Tower”) and Ana.

In the South-Western part, we can see Piatra Sura (“the Grey Stone”), and in the Eastern part (Fundul Ghedelniului), there is a radial crest – Lutu Roșu. Near this crest, there is a deep valley with an Eastern-Western orientation, followed by the Detumulete Complex, Castelul Vrajiț (“the Bewitched Castle”) and Jgheabul cu Hotar. Another radial crest is formed by Șcau Panaghiei, the Piatra Lată Complex, La Mornmite and Chica Fântana, which represent the passage to the Northern mountainside and to the clearing of Durău. The Northern side of the mountain is dominated by the Toaca Peak, the Panaghia rock, Scauloarea Vulturilor, Piatra Ciobanului, Piatra Vulcanului. It is the point of formation of the rivulet Rupturi, with the Duruitoarea waterfall.

The lower level is made up of high hills, with altitudes of about 1000 m, and the third level is constituted by low crests that go down in the valleys.

The rivulets formed on the crests of the Massif are diverging, and the hydrographic system drains into the Bistrița River.

Material and Methods

Scientific observation began in 1999 and included an initial stage that established the existing number of chamois and the optimal number; the monitoring activity began in October 2004, and it aimed at establishing some behavioural aspects, as well as man’s influence.

Detailed observations were made in the mating season, when chamois gather in groups, and all along the year in the gestation, birth, nursing and weaning periods. The observation was made by means of binoculars, the lunettes and by the naked eye. In the high season, in summer, in autumn and especially in the mating season, observations were made near the tourist tracks, in order to see the impact of the tourists on the behaviour of these animals.

Chamois were monitored in the period 1999-2003 by the specialized foresters in the hunting areas Neagra and Schit. In the recent years (2003-2006), the observations and evaluations were undertaken by the Mountain Rescue team of the Ceahlău National Park.

Results and Discussion

The subalpine regions represent the favourite biotope of the chamois (Fig. 2), and, during the frosty winters, they go down to 1300 m in the area of coniferous and deciduous forests, in Piatra Sura and Chica Fântanele.
Figure 2. Group of chamois in the subalpine region, Brăna Vestică (original photo).

- The monitoring areas:

  The evaluation of the number of chamois started with the areas situated close to the tourist tracks, in order to notice the impact of the tourists during the mating season. Thus, on the field trips realized, we noticed that during the “chasing” (pairing) period, chamois avoid tourist tracks, withdrawing to inaccessible woody areas. In this period, only males cross the tourist tracks on their way from one group to another.

  In order to make an exact study on the population of chamois and to cover the whole mountain, the Massif was divided in 12 monitoring areas:

  - Şaua Panaghiei – 8 chamois – October 23rd 2004
  - The Toaca Peak – 6 chamois – November 20th 2004
  - Lespezi – 9 chamois – December 10th 2004
  - Detunate – 6 chamois – December 18th 2004
  - Piatra Lată – 4 chamois – January 7th 2005
  - Brăna Estică – 8 chamois – January 22nd 2005
  - Brăna Vestică – 15 chamois – January 23rd 2005
  - Turnul lui Budu și Ana – 8 chamois – February 17th 2005
  - Gardu Stânilie – 7 chamois – March 2nd 2005
  - Piciroșul Schiop – 4 chamois – March 3rd 2005
  - Piatra Sură – 6 chamois / March 18th 2005
  - Turnul Vulturilor – 23 chamois – April 4th 2005
  - Brăna Vestică – 18 chamois – October 24th 2005
  - Gardu Stânilie – 8 chamois – November 6th 2005
  - Şaua Panaghiei – 10 chamois – November 8th 2005
  - Piatra Sură – 7 chamois – January 10th 2006
  - Piatra Lată – 6 chamois – February 7th 2006

  The monitoring resulted in establishing the real number of chamois in the Ceahlău National Park: 113 individuals. In order to make it easier to establish the number of chamois and their behavior, we attracted them by placing saltlicks in certain monitoring areas:

  1. Chica Fântânele ~ 1500 m of altitude – this area is attracts chamois during frosty winters, when they come down from the rocks in order to find food in the coniferous and deciduous forests;
  2. Piatra Lată (Şaua Panaghiei) ~ 1750 m of altitude;
  3. Strunga Ciobanului (Piatra Ciobanului) ~ 1700 m of altitude.
The evolution of the number of chamois since their introduction in the Massif until the present:

As we stated at the beginning of this paper, the first chamois were brought in 1967-1968 (7 individuals) and, in 10-12 years, their number reached 40 individuals (1980) (Fig. 3).

The inventory realized at the end of the year 2003 showed the existence of 84 individuals, and, in 2006, this number increased to 113 (Fig. 3).

In the period 1999-2003, the number of the population of chamois in the two hunting areas (Neagra and Schit) reached 84. Consequently, the authorities decided to remove some individuals, as follows:

- 1999 – approved removal of 3 individuals, realized: 2;
- 2000 – approved removal of 4 individuals, realized: 0;
- 2001 – approved removal of 3 individuals, realized: 0;
- 2002 – approved removal of 3 individuals, realized: 1;

Starting from 2003, there were no more removals, as the Ceahlău Massif became a National Park.

![Figure 3. The evolution of the number of chamois since 1967 until 2006.](image)

In the recent years, there is an obvious increase in number (Fig. 3). A possible explanation could be the fact that, in the last 10 years, numerous monitoring and protection actions were undertaken as a consequence of the transformation of the Ceahlău Massif into a Natural Reservation and, subsequently, into a National Park (2001). Ceasing these monitoring and protection measures would endanger this favourable situation.

The reproductive cycle lasts a year, starting from November until December the next year (Tab. 1). Chamois are polygamous. They reach sexual maturity in 2-4 years, females in approximately 2 years and males in 3-4 years.

Mating takes place along three months, from November until the end of January. The most intense mating period is between October 25th and November 15th and it is called the “chasing” season. The mating ritual takes place at nightfall and males, in order to win their right to mate, fight each other; in some cases, these fights can even lead to the death of the opponents.

Chamois have a gland at the basis of their ears, under the skin, which enlarges during mating; it also releases a strong unpleasant smell that has the purpose of attracting mating partners. Females anoint their horns with this substance and males rub their head against trees, rocks and grass in order to mark their territory.
Females also have a gland in the cavity from the back of the hoof (the fetlock), that releases a strong “musky” smell. These smelling traces are followed by the young males who are not part of the group and who are waiting for a favourable moment in order to mate.

Table 1. The reproductive cycle.

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Gestation lasts from 168 to 180 days, from January to May, followed by the birth in May, June or at the beginning of July. Before giving birth, the female chases her young from the previous year and withdraws to quit, isolated areas. After the birth, the female cleans and dries her new young. At approximately 3-4 hours from the birth, the young starts to suckle. Chamois usually have one young, (Fig. 4), sometimes even two young of approximately 2 kg.

Nursing lasts from July to October, followed by weaning of the young in October and November.

When they reach sexual maturity, young males leave the maternal group and become solitary or they join the “bachelor” groups, while females can stay for all their life within the maternal group.

Groups are made up of 6 to 30 individuals and are led by old females. Old males (Fig. 5) are solitary or live in separate groups, being involved in struggles over females. Chamois are animals that depend on a territory, so that each group has a well-determined territory.

Chamois change their fur twice a year, according to the season. In summer, they have brown-reddish backs and yellow-reddish abdomen; in winter, their fur is black and brown. On their heads, the fur is light yellow, with a brown stripe from the years to the nose.

Figure 4. Chamois with young; (original photo).

Figure 5. Chamois male; (original photo).
There are two methods for determining the age of an individual: by counting the annual growth rings on each horn and by analyzing its teeth.

Both males and females have straight, but different horns; the horns of the male are more open, curved at 180° and thicker; females have thinner horns, which are less curved - 120°. Female and male horns are made up of two bony cylinders covered by a bony cover with annual rings. Along the year, there are two stages in the growth of the horns: an active growth stage, from April to October, and a slower one, determined by the lack of food, from November to March. In the latter period, a stripe is formed on the horn, separating the growth from two consecutive years and contributing to the appreciation of the age of an individual. Males rub their horns against resinous trees and this substance is deposited at the basis of the horns.

Their vision is very developed because they have a daylight activity and because they can see from a great distance. We can also notice that these animals are not scared when they see the people in red vests of the Mountain Rescue team. We think that this is due to the fact that the “red vests” have always been gentle and quiet in their encounters and they perceive them as neutral beings.

Chamois can make loud strong whistles with their nostrils and they hit the ground with their fore legs in order to alert the group in case of danger or in order to intimidate their opponents in the struggles between males. In each group there is a “sentinel” chamois, which watches the area and alerts the rest of the group in case of danger.

When danger is imminent, the young don’t stick to the ground, they follow their mother. They can jump with all their four feet at once. In the first two months after the birth, the mother and her young stay isolate, and then they join the group. When they are scared, these animals run to inaccessible places, making impressive jumps of up to two meters high and six meters long, and they can reach 40-50 km/h on flat ground.

From the point of view of feeding, chamois are not particular about their food. In the hot season, they eat grassy plants, buds and young twigs, and in winter, they grub the snow with their fore feet in order to get to lichens and to the blueberry stalks. They also feed on savin, cade and spruce. They are daylight animals, they feed in the morning and in the evening, and they spend the rest of the day resting on the rocks.

In very snowy winters, such as the winters of 2002 and 2004, because of the thick layer of snow from the lower levels, chamois no longer come down in the forest, they remain in the subalpine area, where there are no predators and where the strong winds sweep away the snow; thus, they can reach the food easier (Fig. 6). On a strong blizzard (on January 25th 2004), chamois came down in the coniferous forest area and groups were reunited.

Chamois have hooves, made up of two hard horny shoes united by an elastic membrane, which confers adhesiveness to the ground; thus, they can walk in the snow and on the rocks and jump in an impressive manner. The rims of the hooves are sharp and within them there is a concave pad that adheres to the rocks and the ice like a cup. The trace left by the chamois looks like two shoes, long at the tip and round at the basis, and measures about 4-5 cm (Fig. 7).
Natural causes that lead to mortality in the population of chamois

Falls from high rocks, caused by the crumbly character of the rocks: on a raid in an pit in the complex Groapa cu Var, on January 19th 2004, researchers found bones of adult and young chamois. Later, they found out that they had fallen because of the crumbling of the conglomerate specific to that area (Fig. 8).

Snow cornices, formed because of the wind and of the freezing and melting process.

Avalanches: they are quite a frequent phenomenon that represent a real danger for chamois at the beginning of the spring, when the weather starts to warm up; on the field trips in Brana Vestica and Jgheabul Mare (areas with increased avalanche danger), we noticed the marching of these animals: the leader of the group starts to cross the area, followed, in a straight line, by the other chamois, that step on the same footprints, and, finally, by the young. Thus we can draw the conclusion that they know that these paths are dangerous in certain periods of the year.

Rock falls: this danger can be avoided in most cases.

Predators: the wolf and the lynx, especially in winter, when chamois leave the protection offered by the rocks and go down in the area of coniferous and deciduous forests. There are wolves in the Ceahlău Massif, but no attacks on chamois were registered.
Negative anthropic influences on the population of chamois:

Excessive tourism: the increasing number of tourists, especially in the hot season, from May to September, disturbs the living conditions of these animals. Some tourists don’t respect the marked tracks and get close to the chamois groups that get scared and run long distances.

Noise pollution is caused by the tourists, but also by the helicopters that have intensively overflowed the Park (in the summer of 2004 and 2005), carrying materials for the construction of the hermitage “Stefan cel Mare”. The hermitage and the construction that hasn’t been finished yet (an alpine hotel) are located in the strictly protected area of the Park and affect negatively the flora and the fauna of the area. The alpine hotel does not have the building approval of the Scientific Council of the Park.

Because of the noise made by the helicopters and because of the smell of burnt fuel, some chamois moved to the Southern part of the Bistrita Mountains, in the Budacu-Grinties Massif.

The lack of firm measures allowed the advance of grazing to the subalpine area, where the sheep and goat herds, as well as the dogs that accompany these herds can transmit parasites to the chamois.

Poaching: fortunately, it was limited in the recent years due to the involvement of the Association of Mountain Rescue and of the Protection of Biodiversity.

In the summer of the year 2005, shots were herd in the mountains, in the area Piciourul Schiop.

Conclusions

The introduction of the seven chamois in the Ceahlau Massif in the years 1967-1968 was successful for the population of the mountain, as, in approximately 25 years, their number increased to 113 healthy and vigorous individuals.

The favourite biotope of these animals is the subalpine area with shelves clearings and rock excavations.

In the Ceahlau National Park, mating takes place in autumn and it lasts approximately 3 months, the most intense period being the end of October and the beginning of November; gestation covers 5 months (from January to May), around 165-180 days; birth occurs in May, June or July; nursing lasts from July to October, followed by the weaning of the young (October-November).

The main causes that lead to mortality are the following: falling in pits because of the crumbling of the rocks, snow avalanches (when the weather starts to warm up), rock falls and, to a lesser extent, the attacks of the predators: the wolf and the lynx.

Among the negative anthropic influences, we mention: the great number of tourists in the hot period of the year (from May to September), that make a lot of noise; the noise pollution was more acute in the summer 2004-2005, when the military helicopters carried construction materials for the alpine hotel built by the Metropolitan Church. To a lesser extent, we can also mention grazing close to the biotope of chamois, and poaching, which is rendered possible by the weak guard of the Ceahlau National Park.

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