

**THE IMPACT OF THE ANTHROPOGENIC PRESSURE ON THE
AVIFAUNA FROM BASCOV DAM RESERVOIR (ARGEȘ RIVER)
IN THE RECENT YEARS
(2013-2014)**

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ABSTRACT: The Bascov Basin is one of the component dam reservoirs of the ROSPA0062 "Lacurile de acumulare de pe Argeș" that, currently, is in custody of Eco-Montan 2000 Foundation. During 2013-2014, while we studied its avifauna, more types of anthropogenic pressures that menace the birds and their habitats were observed. Also, many of them were observed in the previous years and have been discussed in other occasions. They lead to an obvious decreasing qualitative and quantitative parameters of the avifauna, comparatively with the registered situation on the other basins of the protected area, from upstream and downstream. These are: the silting, the activities connected to the nautical base, the variation of the reservoir water, the fishing, the eutrophication, the overpasturing, the pollution, the burning of the red bed, the clearing of the vegetation, and the buildings from the nearby, associated with the human working. The most important of them is the one represented by the training of the athletes on the whole surface of the basin. Certain considerations are made and some measures of protection are proposed to be introduced in the management plan of the protected area.

Keywords: anthropogenic pressure, avifauna, Bascov Basin, ROSPA0062 "Lacurile de acumulare de pe Argeș".

REZUMAT: Impactul presiunii antropice asupra avifaunei lacului de acumulare Bascov (râul Argeș) în anii recenti (2013-2014).

Lacul de acumulare Bascov este unul dintre lacurile componente ale ROSPA0062 „Lacurile de acumulare de pe Argeș” care, în prezent, se află în custodia Fundației Eco-Montan 2000. În perioada 2013-2014, în timpul studiului avifaunei sale, au fost observate mai multe tipuri de presiuni antropice care amenință păsările și habitatele acestora. Multe dintre acestea au fost observate și în anii precedenți și au fost discutate cu alte ocazii. Ele duc la o scădere evidentă calitativă și cantitativă a parametrilor avifaunei, comparativ cu ceea ce se înregistrează pe celelalte lacuri de acumulare ale ariei protejate, din amonte și din aval. Acestea sunt: colmatarea, activitățile legate de baza nautică, variația de nivel a apei lacului, pescuitul, eutrofizarea, suprapășunatul, poluarea, arderea stufului, defrișarea vegetației și construcțiile din apropiere, asociate cu îndeletnicirile oamenilor. Cea mai importantă dintre ele este cea

reprezentată de antrenamentul sportivilor pe toată suprafața acumulării. Sunt făcute anumite considerații iar unele măsuri de protecție sunt propuse a face parte din planul de management al ariei protejate.

Cuvinte cheie: presiune antropică, avifaună, lacul de acumulare Bascov, ROSPA0062 „Lacurile de acumulare de pe Argeș”.

INTRODUCTION

The Nature 2000 is a European network of areas constituted for the preservation of the natural habitats and species of European interest. Its main goal is to identify, maintain and restore the areas needed for the protection of wild flora and fauna species, as well as of the corridors between them. Often, the species and the habitats from the Nature 2000 sites appeared and maintained as a consequence of the human activities of sustainable exploitation of the natural resources and consequently in the majority of them are permitted economical activities, but the preservation of the species and habitats, anywhere they were created, must have a special attention. The buildings and other works that affect the species and the habitats of communitarian importance are not permitted in these areas, except the ones relevant for the human assurance, or that of national importance (<http://natura2000.ro/ce-este-reteaua-natura-2000/>). The maintaining of the Nature 2000 network is an engagement of Romania as a member of European Union and the Government Decision No. 80/2012 admits that the natural protected areas are properties of national interest (<http://natura2000.ro/tag/natura2000/>).

The avifauna of the Bascov reservoir has been researched soon after the building of the basin (Munteanu & Mătieș, 1983) but the birds from the area were the subject of many scientific papers published mainly after 1995. They were studied individually or as part of larger research-studies regarding the ornithofauna of the Argeș River (Gava, 1997; Mestecăneanu et al., 2003; Gava et al., 2004a; Gava et al., 2004b; Mestecăneanu et al., 2004; Conete et al., 2005a; Conete et al., 2005b; Conete et al., 2006; Conete et al., 2008; Conete et al., 2010; Mestecăneanu et al., 2010; Conete, 2011; Conete et al., 2012a, etc.). Over time, more types of anthropogenic pressure on the birds from the area were registered (Conete & Mestecăneanu, 2008; Conete et al., 2012b; Conete, 2011).

MATERIAL AND METHODS

The Bascov dam reservoir is a part of the ROSPA0062 “Lacurile de acumulare de pe Argeș”. It has been declared protected area for the birds and Nature 2000 site by Government Decision No. 1284/2007, modified and completed by Government Decision no. 971/2011. It contains six dam reservoirs (from upstream to downstream: Zigoneni - 165 ha, Vâlcele - 408 ha, Budeasa - 413 ha, Bascov - 162 ha, Pitești - 122 ha and Golești - 680 ha). Additionally, few adjacent surfaces enter in the area, mainly upstream of Zigoneni reservoir and downstream of Golești reservoir, so that the total protected area measures nearly 2260 ha.

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Particularly, Bascov reservoir is a reservation for the birds since 2004, when the Government Decision no. 2151/2004 sets up its regime of protected area (Alexiu et al., 2011).

The Bascov dam reservoir (Fig. 1) is placed on the Argeş River in the hilly zone. It is positioned immediately downstream of Budeasa Basin, close to Bascov locality (after which it is named). Sudeaua Road assures the access on the eastern and southern parts. The road that connects DJ703K with DN7C crosses it upstream (over the Budeasa dam). From here another road starts on the right bank of the reservoir, where a nautical base (The National Sports Complex Bascov – Budeasa, Argeş – Romania) has its headquarters. The base was established in 1982 and, currently, includes (in order of construction) the tower, the stand, the pontoons, the shower cubicle, the hotel and the hall for judo and boxing. In 2011, the tower situated at the finish line of kayak – canoe track was modernized (cf. <http://www.csnbascov.ro/scurt-istoric.html>).

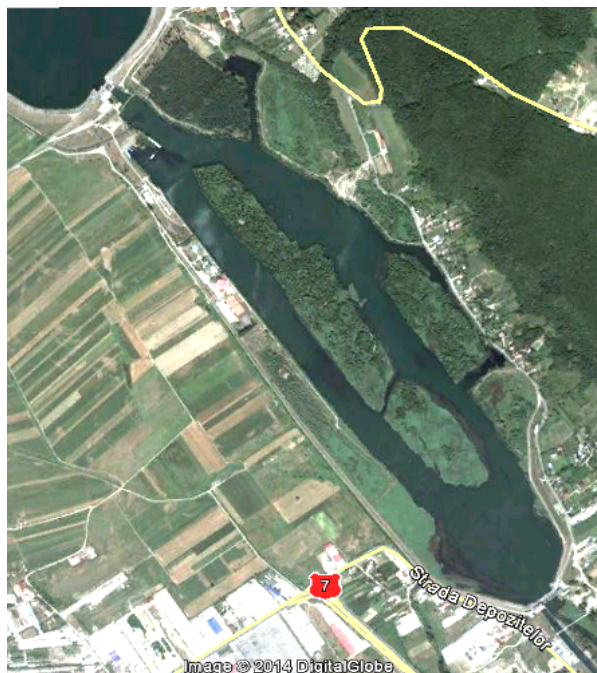


Figure 1 - Aerial view of Bascov Basin
(cf. Google Earth).

There are three big islands in the reservoir. Two of them (together with the right bank of the reservoir) form a corridor developed as place of training and competition for the rowers.

From the biological point of view, the water of the Bascov accumulation lake is oligotrophic and from the physico-chemical point of view it is in the second class of quality (cf. <http://apmag.anpm.ro/>).

The construction of the reservoir was finished in 1970. The dam has 21 m height; 5.3 million m³ of water can be accumulated behind it. It is a gravity and earth dam, having internal breast and concrete type of watertight and rocky and non-rocky foundation type. Its primary purposes are: the supplying with water of the consumers, the production of electrical energy and the irrigations (cf. http://www.baraje.ro/rrmb/rrmb_d4.htm).

The climate of the region is temperate continental with hilly influence. The annual mean of the air temperature is ca. 9.5⁰C. In January it is ca. -2.2⁰C and, in July, ca. 20.5⁰C. The annual temperature of the water is on average 1⁰C more than

the one of the air. The ice sheet forms often in January and February. The precipitations measure ca. 650mm/year. Generally, February is the driest month and June is the rainiest (Barco & Nedelcu, 1974). Naturally, the level of water of the reservoir varies according to the rains and melting of the snow. Generally, it grows in spring and decreases during the summer.

The vegetation of the reservoir is represented by various species from the genera: *Carex*, *Juncus*, *Salix*, *Alnus*, *Populus*, *Typha*, *Phragmites*, etc. (that grow preponderantly on the islands) and by *Myriophyllum spicatum* L., *Alisma plantago-aquatica* L., *Potamogeton crispus* L., *Sparganium erectum* L., *Lemna minor* L., etc., that develop in water (Alexiu, 2008).

The fauna of fish includes: *Squalius cephalus* (Linneus, 1758), *Barbus petenyi* Heckel, 1852, *Sabanejewia romanica* (Băcescu, 1943), *Stizostedion lucioperca* (Linnaeus, 1758), *Perca fluviatilis* Linnaeus, 1758, *Esox lucius* Linnaeus, 1758, *Alburnus alburnus* (Linnaeus, 1758), *Carassius gibelio* (Bloch, 1782), *Cyprinus carpio* Linnaeus, 1758, etc. (Ureche et al., 2007, information from fishermen). It appertains to the afterbarbe (*Barbus* sp.) zone (Bănărescu, 1964).

At present, the site ROSPA0062 “Lacurile de acumulare de pe Argeș” is in custody of Eco – Montan 2000 Foundation. The Contract of Custody no 213/29.03.2011 was signed after the attribution session organised by the Ministry of Environment in March 2011 (<http://www.ecomontan.ro/index.php/lacuri/lacuri-statut-juridic>) and the Foundation follows to prepare the management plan of the area.

The bird fauna of the Bascov Basin was studied using the fixed point of surveillance and the itinerary method. The researches were performed between 10 and 20 of every month (2013-2014). On this occasion, observations about the anthropogenic pressure on the birds and their habitats were performed.

RESULTS AND DISCUSSIONS

The antropogenic pressure affects negatively the qualitative and quantitative parameters of the avifauna.

Before discussing the birds' stress generated by humans, it must be said that the presence of the birds in the area depends on both on the local conditions (habitat, food, predators, climate, antropogenic pressure) and on the national, even international, ones. They influence the breeding success and the mortality, both in the ground of reproduction and in the passage and wintering areas and, on the other hand, they play an important role in the seasonal movements. For instance, at general level, the meteorological conditions, which vary from a year to another, provide different annual dynamics. So, many migratory birds remain for wintering in the north during warm winters, and, almost all the individuals go south in the extremely cold winters and counting the individuals from one area we can believe that the number of birds is decreasing. In other cases, when the weather is severe in north and mild in the respective area, the effect is opposite. Therefore, the studies

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on the populations, migration and ecology of the birds are preferable to be performed along many years and to cover large zones.

The most important pressure on birds on long term is the **silting** of the basin. The volume silted is considered to be about 93% (Rădoane & Rădoane, 2005) and it has both anthropogenic and natural causes: the small volume of the initial project, the placement in a zone with important alluvial transport, the reduction of the water speed in the basin and, consequently, of its transport power, the geology formed by sedimentary deposits, the massive deforestation, the lack of improvements for the Argeş tributary with crests for alluvial storage. It menaces the function of the harnessing at projected parameters, making difficult the service of the employments. As a result, currently, the water volume and the real surface of water from behind the dam diminished comparatively with the initial situation (Mititelu, 2010; Mititelu, 2011; Mititelu, 2013). At the beginning, the silting favoured the fixing of the swamp vegetation, concomitantly with the evolution of the first phases of the eutrophication, which transformed the accumulation in propitious place for the wetland birds. However, in time, the process becomes negative, because it threatens even the existence of the reservoir that will return to its primary stage, i.e. river. That means a restriction of the birds' areas of breeding, feeding and roosting, with negative effects principally on their strength, mainly in passage and winter times. On the other hand, a well-kept accumulation lake is less favourable for breeding than a natural lake, because of the poorer trophic level, a fact observed by other authors, too (Munteanu & Mătieş, 1983). Connected with the silting is the opposite process of **desilting**. Currently, it does not exist but in the future it is envisaged. It must be done such as to minimize the impact on the avifauna. The birds must not be disturbed in their nests in the breeding period and, also, in the passage and in winter, when they gather in big number on the dam reservoirs.

On short term, the most important anthropogenic factor that manifests on the birds coenose from the Bascov basin is the one represented by the **activities connected to the nautical base** (Fig. 2). In the context when, starting with 2014, there are preparations for the set-up (in September 2015) of a European Championship of Sprint and, also, for introduction in the international circuit of the kayak-canoe track (<http://www.csnbascov.ro/scurt-istoric.html>), that suppose the enlarging of



Figure 2 - Sportsmen returning through the unimproved space (February 20, 2013).

the channel between the right bank of the reservoir (in the water flow sense) and the two big islands from the middle, the birds will be very affected. This means to dredge the islands banks covered by reed and diverse species of trees and scrubs, that makes the access very difficult for man; in favourable situations, they could provide excellent conditions of breeding and roosting for more species of herons, wildfowl, grebes, rails, crakes, moorhens, coots, warblers etc. Also, the thickness of the vegetal lay could be perfect for numerous terrestrial birds (Passeriformes, Piciformes, Falconiformes etc.), some of them already living on the islands. By now, the stress caused by the athletes that frequently train and compete on the water surface (often monitored by coaches or referees in motor boats) is big enough, fact reflected mainly in the low abundance of the aquatic birds. They perturb the birds in many ways: enter in their places of breeding, roosting or feeding, flood the nests with the swirl, and they pollute the birds acoustically, etc. The rowers use not only the special area that exists on the right side, but all the surface of the water, including the sector close to the dam and the one from the left part of the basin, encircling the islands. Consequently, they determine the birds to leave the reservoir and to search more peaceful places.

The **variation of level of the reservoir water** is another important factor of antropogenic pressure. It can be caused by the drainage or by the increase of water level. Usually, the **drainage** is made during the maintenance works of the dam installation or, as a measure of prevention, anterior of the debit growing, caused by the rich rains associated or not with the snow melting. The drainage (total or partial) can be beneficial, chiefly in the first days, for the waders, while for the most aquatic birds it has often a negative effect, mainly if it is of long period, because it misses these birds of food and shelter. Moreover, the drainage is associated with a rising of the raptors number (wild: foxes, crowns, or feral: cats, dogs) that attack easier the clutches and the broods. Also, immediately after the drainage, many peoples rush to the bottom of the basin in search of fish, scaring the birds (Fig. 3). The inverse process, of **overcharging** of the reservoir, caused by the abundant precipitations or by some maintenance works to the other dams from the Argeş River, is also intrusive because it can deluge the nests or hatchling or reduce the area of feeding.



Figure 3 - Humans searching for fish (in the background, *Larus ridibundus* and *Egretta garzetta*) at August 20, 2013.

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The **fishing** disturbs the birds, too. Sometimes there are more than 100 persons who fish. They are cantoned mainly on the Budeasa Dam and on the left bank of the reservoir and in winter they advance on ice to fish at waterhole. Also, many fishermen use boats (motorised or not) for off shore fishing. The stationing for long time in the same position determines the impossibility of the birds to reach the nests or the feeding places. Furthermore, the activity is frequently associated with the destructions of vegetation and with the access of the vehicles in the places of angling.

The **eutrophication** has little importance in this moment. It is manifested through the increasing of the amount of nutrients from the water. It has natural or artificial origins and is linked to the silting and the stagnancy of the water and, also, by the rising of the water temperature that, together, conduct to the algal bloom. This reduces the amount of oxygen and amplifies the amount of carbon dioxide from the water. As a result, the aquatic organisms die and their putrefaction spreads toxic compounds, additionally diminishing the quality of the water. The intensive farming is the main artificial source of the eutrophication. The fertilizers used on the soil for the increasing of agricultural production are driven by the precipitations and consequently they arrive at the courses of water from the collector basin of the Argeş River.

The **overpasturing** was sporadically noticed on the eastern bank, near the village. The critters eat the vegetation and can contribute to the soil erosion. Moreover, the drovers perturb the birds, having a bigger impact in the reproductive period of the birds.

The **pollution** has two aspects: chemical and physical-chemical. There are not big polluters upstream and Curtea de Argeş town is the most important of them. A special type of pollution is the one with plastic material, principally liquids containers. Generally, they are collected by the running streams and deposited in reservoirs. Because the Budeasa accumulation lake retains the majority of them, the most of the intrusive material comes from the locals or fishermen. In these circumstances, the waters of the Bascov accumulation are fresh enough; they belong to the “good” quality class. The pollution can affect the ecological condition of the water body. It is only “moderate” and the reason is the biological elements (phytobenthos), (Mititelu, 2011).

The **burning of the reed bed** was observed on little areas. Generally, this kind of damage is accidental or is caused by the fishermen that want to clear the areas in order to reach good places of fishing. Another reason is represented by the belief of some humans that the burning of the reed is useful because the snakes (considered dangerous) are killed. The burning for fun can be an explication, too. By burning the reed many places of feeding and resting for birds disappear and the breeding time for some species can be delayed. Generally, the entire biodiversity suffers.

The **clearing of the vegetation** was observed sporadically in the period of study. The stems are used in the traditional manufacture and the wood is used mainly as material for fire or as props. Principally, the vegetation from the external

banks of the reservoir is exploited but, when the ice sheet is formed, the natives cross it to cut the trees from the islands, with negative effects on the birds. The cutting of the vegetation can produce some erosive effects, too.

Also, the human activity associated with the **buildings from the nearby** (settlements, hotelier complex, nautical base, gravel pit) causes trouble for the birds. It determines them to leave the area. Similarly is the case of the roads, when the most of the birds are perturbed by the traffic.

Other negative human impact, observed on some reservoirs from vicinity, like the hunting and poaching, the recreational activities (other than fishing), the rearing of constructions were not seen in the period of study on the Bascov Basin. As regards the hunting and poaching, the explanation is that that the proximity of the settlements and of the other constructions near the protected area blocks these kind of activities.

Between February 2013 and January 2014, 38 birds' species were observed on the Bascov Basin: *Gavia arctica* (Linnaeus, 1758), *Podiceps cristatus* (Linnaeus, 1758), *Tachybaptus ruficollis* (Pallas, 1764), *Phalacrocorax carbo* (Linnaeus, 1758), *Egretta garzeta* (Linnaeus, 1766), *Egretta alba* (Linnaeus, 1758), *Nycticorax nycticorax* (Linnaeus, 1758), *Ciconia ciconia* (Linnaeus, 1758), *Cygnus olor* (Gmelin, 1789), *Anas platyrhynchos* Linnaeus, 1758, *Anas penelope* Linnaeus, 1758, *Aythya ferina* (Linnaeus, 1758), *Mergus albellus* Linnaeus, 1758, *Buteo buteo* (Linnaeus, 1758), *Fulica atra* Linnaeus, 1758, *Larus argentatus cachinnans/michahellis* Pontoppidan, 1763, *Larus canus* Linnaeus, 1758, *Larus ridibundus* Linnaeus, 1766, *Chlidonias hybridus* (Pallas, 1811), *Sterna hirundo* Linnaeus, 1758, *Streptopelia decaocto* Frivaldszki, 1838, *Alcedo atthis* (Linnaeus, 1758), *Riparia riparia* (Linnaeus, 1758), *Hirundo rustica* (Linnaeus, 1758), *Delichon urbica* (Linnaeus, 1758), *Motacilla cinerea* Tunstall, 1771, *Motacilla alba* Linnaeus, 1758, *Garrulus glandarius* (Linnaeus, 1758), *Pica pica* (Linnaeus, 1758), *Corvus monedula* (Linnaeus, 1758), *Corvus frugilegus* Linnaeus, 1758, *Corvus corax* Linnaeus, 1758, *Prunella modularis* (Linnaeus, 1758), *Acrocephalus arundinaceus* (Linnaeus, 1758), *Sylvia curruca* (Linnaeus, 1758), *Luscinia megarhynchos* (Brehm, 1831), *Passer domesticus* (Linnaeus, 1758), *Emberiza schoeniclus* (Linnaeus, 1758). They were represented by 1620 individuals. Only 9 are protected by the Annex I of the Birds Directive (*Gavia arctica*, *Egretta garzeta*, *Egretta alba*, *Nycticorax nycticorax*, *Ciconia ciconia*, *Mergus albellus*, *Chlidonias hybridus*, *Sterna hirundo*, *Alcedo atthis*). *Fulica atra* was the only one observed every month. It is less affected by the humans and among the aquatic species, it and *Anas platyrhynchos* are the two species that breed certainly in the area.

Comparatively, in despite of the smaller surface, on Pitești Basin 87 birds' species were observed in the same period, which means more than twice that the one registered on the Bascov Basin. There are 18044 individuals (over 11 times much more than the maximum number recorded on this basin). Zigoneni Basin, which has a similar area, has had 114 species of birds and almost 10000 individuals (3 times the number of species and more than 6 times the number of individuals).

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The huge differences is due to the fact that on this two dam reservoirs does not exist continuous major disturbances (in this case, the training of the athletes), although the first is near Piteşti and the second is near Vâlcele village. Both are the subject of the relatively same type of pollutions; additionally, the second one is a place of occasional hunting.

On the other hand, during 2003-2010, 185 birds' species were observed on the Bascov Basin, most of them being rare here (Conete, 2011). Some are frequent species on the other basins of the Argeş River. These facts suggest that, without a strong anthropogenic pressure, the Bascov accumulation can be a favourable place for the birds.

CONCLUSIONS

At the moment, 10 types of anthropogenic pressure on the birds of the Bascov Basin were identified. Among them, on long term, the most important is the silting and, on the short term, the activities at the nautical base. Other influences (the variation of level of the reservoir water, the fishing, the eutrophication, the overpasturing, the pollution, the burning of the reed bed, the cutting of the vegetation, the human activity associated with the buildings from the nearby) have a smaller impact.

In the future, for the birds and habitat conservation, the economical, recreational and sporting activities should diminish. The site should have even a status of area of strict protection, where only the activities for which the dam was built are permitted (the supplying with water of the consumers, the production of electrical energy, the irrigations and the maintenance works).

The measures of protection must be included in the management plan of the area. These actions are:

- The maintenance tasks must be done with a minimal impact on the birds and the drainage should be performed between 1 and 15 September;
- The silting of the basin must be reduced through the harnessing of the tributaries of the Argeş and here an important role must have the reconstruction of the parks, that will decrease the erosion of the banks;
- The desilting of the basin must be done gradually, on small surfaces, without damaging the birds' places of breeding, feeding and resting; it must not change the general configuration of the basin;
- The athletic activities should be performed only in the sector from the right shore of the accumulation; from a strictly avifaunistical point of view, it is preferable to give up these activities in the whole area;
- The variation of water level must be minimum and, in case of emergency, a temporary and significant decrease of the level (as a measure of precaution) is preferable then an overcharging;
- The fishing must be restrained to a small portion of the bank, near the Budeasa village, and, maybe, on the dam; the fishing in other places must not be permitted, including the fishing from boats;

- The traditional (bio) agriculture must be encouraged in the hydrographical basin of the Argeş River;
- The pasturing must be limited to few places, where the birds are not affected; the overpasturing must be avoided;
- The pollution must be reduced drastically: the overflowing of the used water directly in the lake must be banned and the rubbish must be gathered and eliminated;
- The burning of the reed bed must be eradicated;
- The cutting of the vegetation (sprouts and bulrush) should be limited without disturbing the birds; only the local people should be allowed to do this and the exploitation of the arbores must be banned;
- The new constructions from the vicinity must be done only on the existent places while in the area of protection they must be banned;
- The visiting must be done only on the tracks and in the terms decided by the conservator of the area; other recreational activities should be banned;
- The educational activities with the citizens from the bordering settlements, regarding the importance of the site, must be performed periodically.

The protection of the birds and of their habitats is a necessity; the best way to do this is to inform the communities about the negative impact of the anthropogenetic pressure. The negative impact of the humans on the Bascov Basin, as well as on the other reservoirs part of the ROSPA0062 “Lacurile de acumulare de pe Argeş”, must be diminished, otherwise, even the criteria wherefore the area was declared a protected site (rare species and over 20000 individuals present in passage) is possible to fail.

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