

## ASSESSMENT OF PRESSURES AND THREATS ON A PROTECTED AREA (THE DAFFODIL MEADOW IN THE NEAJLOV VALLEY)

Sinziana Venera Morarita

Valahia University of Targoviste, 13, Sinaia Alley, Targoviste, Romania. E-mail: [cristi2morarita@yahoo.com](mailto:cristi2morarita@yahoo.com)

ORCID number: Sinziana Venera Morarita– 0000-0002-1252-0260

### Abstract

*The Daffodil Meadow in the Neajlov Valley is a small botanical protected area of national interest whose conservation value is linked to the population of *Narcissus stellaris* and to the ecological functions of the Neajlov meadow. The study assesses the main pressures and threats affecting this protected area, clarifies the methodological steps used for evaluation, and proposes management measures adapted to the conservation objective of the reserve. The analysis combines documentary sources, legal and management references, field observations, and a qualitative pressure-impact matrix. The main pressures identified are uncontrolled visitor access during the flowering period, grazing and trampling, waste accumulation, hydrological changes, agricultural inputs from the surrounding landscape, and insufficient permanent monitoring. The recommended measures include seasonal access control, marked ecological trails, annual population monitoring of *Narcissus stellaris*, cooperation with local communities and authorities, and clearer reporting of conservation indicators.*

*Keywords: protected areas; biodiversity; habitats; species; ecological balance.*

### 1. INTRODUCTION

Protected areas are established to maintain biodiversity, ecological processes and ecosystem services, but their efficiency depends on the way in which pressures are identified, monitored and managed [3,7,13]. In the case of small botanical reserves, conservation success is strongly influenced by local land use, visitor behaviour and the continuity of habitat management. The Daffodil Meadow in the Neajlov Valley represents such a case because it protects a floristic habitat dominated by *Narcissus stellaris* and is located in a meadow landscape exposed to seasonal tourism, grazing and agricultural activities [1]. The aim of the study is to assess the pressures and threats acting on the protected area and to formulate practical conservation measures.

The specific objectives are: (i) to describe the legal and ecological context of the reserve; (ii) to identify the main anthropogenic and natural pressures; (iii) to estimate the relative impact of these pressures on biodiversity and habitat quality; and (iv) to correlate the proposed management measures with the identified pressures [2,4,5].

The case study was selected because the reserve has a restricted surface, a clearly defined conservation target and a direct relationship with local communities. Such reserves are vulnerable to cumulative effects: even small disturbances, if repeated annually, can reduce the regeneration capacity of the protected plant population and degrade the meadow structure [6,8,14].

The research contributes to the improvement of protected-area management by translating general conservation principles into locally applicable actions. The approach follows the logic recommended for protected areas: identification of values, identification of pressures, evaluation of impact and prioritisation of management actions [2,3,4].

Consequently, the study is designed not only as a descriptive presentation of the site, but also as an applied assessment that can support future monitoring, reporting and revision of management measures for this botanical reserve.

### 2. MATERIALS AND METHODS

The study area is the Daffodil Meadow in the Neajlov Valley, Dâmbovița County, Romania. The reserve is situated in the Neajlov meadow, a right tributary of the Argeș River, in the northern part of Broșteni village, near county road DJ 611, on the administrative territory of Petrești and Vișina communes.

The protected area was declared by Government Decision no. 2151/30.11.2004 and has a botanical conservation role, protecting the population of *Narcissus stellaris* [1].

The methodological framework included four stages. First, the legal and documentary analysis was carried out using the act of designation of the reserve, national guidelines for protected-area management and scientific or technical references concerning monitoring, conservation and pressure assessment [1-7].

Second, the ecological value of the site was described in relation to the target species, meadow habitat and ecosystem services such as water retention, soil protection and landscape value [3,7,13].

Third, field observation was used to identify visible signs of pressure in and around the reserve. The observations focused on the condition of the daffodil population, trampling traces, informal access routes, waste, grazing signs, changes in vegetation cover, proximity of agricultural land and potential hydrological alterations. Figure 1 illustrates the protected floristic element, *Narcissus stellaris*, which represents the main conservation target of the reserve.



**Figure 1.** *Narcissus stellaris*, the target species protected in the Daffodil Meadow of the Neajlov Valley

Fourth, the pressures were grouped into categories and evaluated qualitatively according to three criteria: intensity, spatial extent and reversibility. Each pressure was classified as low, moderate or high and then related to possible effects on the conservation objective. This approach is consistent with protected-area management guidelines, which recommend linking each pressure to a measurable or observable conservation consequence [2,4,5]. The categories used in the assessment were: climate and hydrological change, habitat degradation and fragmentation, agricultural pollution, visitor pressure, grazing and trampling, waste accumulation, and weak monitoring or law enforcement. The selected categories correspond to pressures frequently reported for protected areas and small reserves in Romania and Europe [7,13,14].

The analysis did not aim to produce a complete statistical model, because long-term quantitative monitoring data for the reserve are limited. Instead, it provides a structured diagnostic assessment based on available information and direct observation. This limitation is important: the conclusions should be used as a basis for future annual monitoring rather than as a substitute for detailed population surveys.

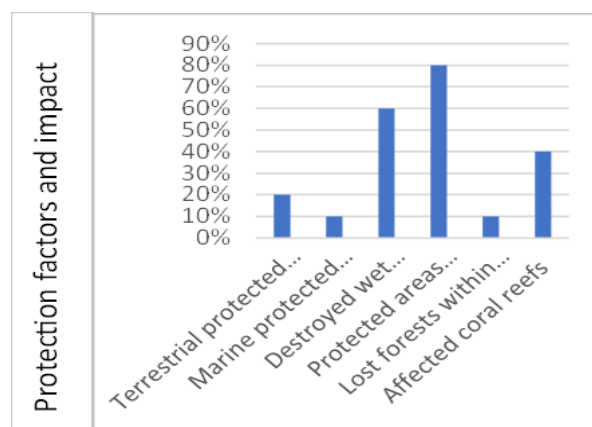
The figure included below documents the floristic value that justifies the protected status of the site. Maintaining the flowering population requires avoiding mowing, grazing or heavy tourist access during the sensitive vegetative and flowering stages [1,6].

For the interpretation of pressure intensity, the study used an impact scale from 0 to 100%, where higher values indicate a stronger expected effect on biodiversity, habitat quality or the target species. The values shown in Figures 2 and 3 are indicative and should be interpreted as a synthesis of observed and documented pressures, not as direct measurements from a long-term monitoring programme. This methodological clarification is necessary because the figures are intended to support the discussion, not to replace field inventories.

Their role is to visualise the relative importance of the pressures and to help prioritise management actions for the protected area.

The main methodological limitation is the absence of a multiannual database on the number of flowering individuals, soil compaction, visitor frequency and water regime.

Therefore, future monitoring should include fixed observation plots, photographic points, seasonal visitor counts and annual reporting of threats [4,5].



**Figure 2.** Indicative impact of selected pressures on the protected area

Figure 2 summarises the relative impact of the main pressures considered in the assessment.

The highest values are associated with loss of habitat, visitor pressure and pollution, while moderate values are associated with climate change and hydrological changes. This hierarchy is consistent with the study objective of identifying the pressures that require priority management intervention.

Climate and hydrological changes may influence the reserve by altering soil moisture and the duration of the flowering period.

For meadow species such as *Narcissus stellaris*, changes in precipitation, drought frequency or water retention can affect germination, flowering and long-term persistence of the population [8,14]. In the Neajlov meadow, these factors should be monitored together with vegetation cover and flowering density.

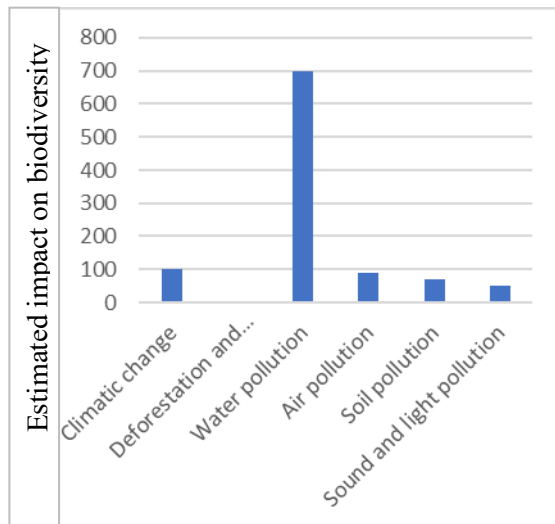
Habitat degradation is the most direct threat because the conservation target depends on the integrity of the meadow habitat.

Trampling, informal paths, uncontrolled mowing or grazing and local soil compaction can reduce regeneration and can facilitate the expansion of competitive ruderal species. For this reason, habitat condition should be treated as a core monitoring indicator [2,4,6].

Pollution represents another relevant pressure, especially through waste left by visitors and possible nutrient or pesticide runoff from nearby agricultural areas.

Even when pollution is local and seasonal, it can change soil conditions, affect plant communities and reduce the aesthetic value of the protected area [5,7].

The pressure categories are detailed in Figure 3. The figure shows that visitor pressure and waste/pollution have the strongest estimated effects, while noise and light pollution are less important for this reserve than for large faunal protected areas. The interpretation is therefore adapted to the local floristic objective of the site.



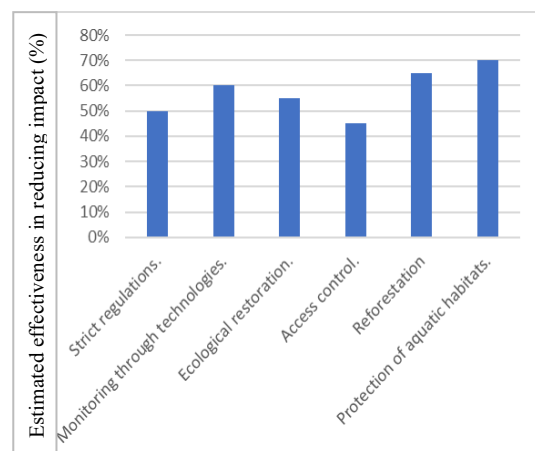
**Figure 3. Estimated effect of pressure factors on biodiversity and habitat quality**

Poaching is not a central threat for this botanical reserve, but overexploitation can appear in the form of illegal picking of flowers or removal of plants. Such actions directly affect the protected species and should be discouraged through information panels, local patrols and community education during the flowering season [1,2]. Grazing and trampling are more relevant than classic poaching. Livestock presence or repeated human access in the flowering area can damage stems, compact the soil and reduce seed production. These pressures should be controlled through temporary fencing, seasonal access rules and clear delimitation of visitor paths [4,6]. The assessment indicates that effective monitoring and enforcement can reduce the impact of pressures, but only if responsibilities are clearly assigned. The reserve requires an annual checklist that records the state of the population, visitor pressure, waste, grazing traces and any changes in land use around the protected perimeter [2,4,5]. Uncontrolled tourism is particularly important during the flowering period, when the attractiveness of the reserve increases. Without visitor management, access can lead to vegetation damage, waste accumulation and disturbance of the meadow structure. Therefore, tourism should be organised as low-impact ecotourism, with marked routes and educational messages [7,11]. The effects of these pressures are cumulative. A single pressure may appear moderate, but repeated annual trampling, local pollution and lack of monitoring can gradually reduce habitat quality. This cumulative effect is the main argument for integrated management measures rather than isolated actions [3,4,14].

In relation to the aim of the study, the methodological assessment shows that the Daffodil Meadow in the Neajlov Valley needs priority actions focused on habitat protection, visitor control, prevention of plant collection, reduction of waste and annual monitoring of the target species.

### 3. RESULTS AND DISCUSSIONS

The results show that the most important pressures for the Daffodil Meadow in the Neajlov Valley are visitor pressure, trampling/grazing, habitat degradation, waste accumulation and possible hydrological or agricultural influences. These results respond directly to the first two objectives of the study: identifying threats and estimating their relative impact. The pressures are not independent; their combined effect may reduce the conservation status of *Narcissus stellaris* and the ecological quality of the meadow [1,4,6]. Regarding the third objective, the assessment indicates that current protection is mainly legal and declarative, while operational management needs to be strengthened. A legal protection regime is necessary, but it is not sufficient if it is not supported by signage, monitoring, periodic reporting and active collaboration between local authorities, administrators and the community [2,3,5]. Modern monitoring technologies can improve management, but in this reserve they should be used in a proportionate manner. Fixed photographic points, GPS mapping of the flowering area, simple drone images taken outside sensitive periods and annual records of visitor pressure would be more realistic than complex technological systems. These tools can provide comparable data from year to year [4,12]. Ecological restoration should focus on maintaining the meadow structure and preventing further degradation. The practical measures include removing waste, closing informal paths, controlling grazing, avoiding soil disturbance during the flowering and seed-setting period and restoring vegetation in compacted areas. Such measures are consistent with the conservation objective of maintaining the target species and habitat quality [2,6,7].



**Figure 4. Estimated effectiveness of proposed conservation strategies**

Figure 4 summarises the expected effectiveness of the proposed measures. The highest effectiveness is associated with prevention of anthropic activities, reinforced monitoring and management planning. This confirms that the most suitable response is preventive management, because the reserve is small and degradation can occur quickly if access and land use are not controlled [2,4,5].

Local community involvement is essential for implementation. Residents, land users and visitors should be informed that the reserve protects a specific species and that collecting flowers, uncontrolled grazing and leaving waste directly affect its persistence. Community-based activities, such as guided visits, educational actions and local volunteering, can reduce conflicts and increase compliance [7,11].

Sustainable tourism management should therefore be organised around the flowering period. The recommended measures are: temporary access rules during peak flowering, marked trails, information panels, waste collection points outside the sensitive habitat, and communication campaigns before and during visitor peaks. These measures link tourism benefits with the conservation objective [7,11].

Combating pollution requires both prevention and rapid removal. The reserve should have a simple protocol for identifying waste, reporting it and removing it without damaging vegetation. In addition, agricultural runoff from neighbouring areas should be considered when evaluating soil and vegetation changes [5,6].

The discussion confirms that conservation strategies must be adapted to the scale of the reserve. Large-scale measures such as complex infrastructure are less appropriate than low-cost but repeated actions: monitoring, signage, seasonal control, communication and cooperation with local authorities. This approach is compatible with the IUCN management logic for small protected areas [3,4].

The relationship between results and objectives is summarised as follows: the ecological value of the reserve is represented by *Narcissus stellaris* and the meadow habitat; the highest pressures are anthropogenic and seasonal; the most effective measures are preventive and community-based; and the main knowledge gap is the lack of long-term quantitative monitoring.

Habitat connectivity is also relevant, although the reserve is small. The surrounding meadow and agricultural landscape influence the protected area through water flow, access routes and edge effects. Therefore, management should not stop at the formal boundary but should consider the buffer zone and the activities taking place nearby [2,5].

Continuous monitoring should become the central management instrument. The minimum annual indicators recommended by the study are: number or density of flowering individuals in fixed plots, visible trampling area, number of informal paths, waste presence, grazing signs, mowing date and soil moisture observations. These indicators would make future evaluations more precise [4].

The results also show the need for clear institutional cooperation.

The reserve cannot be efficiently managed only through restrictions; it requires collaboration between environmental authorities, local administrations, land users, schools and civil society. This cooperation can transform conservation from a formal obligation into a locally supported practice [2,7,11].

The management implications are practical: delimit the sensitive core area, install explanatory panels, organise seasonal surveillance, prohibit flower picking, restrict grazing during sensitive periods, collect waste after visitor peaks and publish a short annual monitoring report.

These measures directly address the reviewer-identified need to connect results with the aim and objectives of the study. They show which pressures were identified, why they matter and how the proposed solutions respond to them.

From a scientific perspective, the revised assessment remains qualitative, but it establishes a transparent basis for future quantitative monitoring. This is appropriate for a preliminary case study where historical datasets are limited and where the immediate priority is to organise conservation action [4,5].

For sustainable management strategies to be effective, collaboration is necessary between environmental authorities, local authorities, non-governmental organisations and the local community. The expected outcome is the preservation of the target species, improved habitat condition and a better balance between public access and biodiversity conservation.

#### 4. CONCLUSIONS

The study demonstrates that the Daffodil Meadow in the Neajlov Valley is exposed mainly to local and seasonal pressures rather than to large-scale industrial threats. The most relevant pressures are uncontrolled access during the flowering period, trampling, grazing, waste accumulation, habitat degradation, possible agricultural pollution and insufficient systematic monitoring. These findings answer the main aim of the paper by identifying the pressures that can affect the conservation objective of the reserve [1,4,6].

The conclusions stress the importance of integrated measures that combine legal protection, annual monitoring, community involvement and practical visitor management. Remote sensing and GIS tools may be useful, but for this reserve the most urgent measures are fixed monitoring plots, clear delimitation, information panels, seasonal surveillance and a simple annual reporting system [2,4,5].

The proposed measures correspond to the specific objectives of the study.

The legal and ecological context was clarified; the main threats were identified; their relative impact was interpreted through the figures; and the management recommendations were linked to the conservation needs of *Narcissus stellaris* and the meadow habitat.

The relevance of the results for protected-area management consists in their practical applicability. By prioritising preventive measures, the reserve can reduce degradation before it becomes irreversible. Local authorities and communities can use the proposed checklist to organise monitoring and to justify conservation actions during the periods when visitor pressure is highest [7,11].

The study has several limitations. The assessment is based on available documentation and qualitative field observation, while long-term numerical data on population size, visitor flows, grazing intensity and soil conditions are limited. For this reason, the impact values shown in the figures should be considered indicative and should be validated by future monitoring [4,5].

Future research should include annual population monitoring of *Narcissus stellaris*, mapping of the flowering area, evaluation of soil compaction, analysis of hydrological conditions and assessment of visitor pressure. These data would allow a more precise evaluation of conservation status and management effectiveness [4,12].

Another research direction is the socio-economic analysis of the relationship between the reserve and the local community. Sustainable tourism and environmental education can support conservation only if they are organised in a way that avoids damage to the protected species and provides visible benefits for local stakeholders [7,11].

Overall, the conservation of the Daffodil Meadow in the Neajlov Valley requires a multidisciplinary but very practical approach: clear rules, permanent communication, regular monitoring and rapid intervention when pressures are observed. The success of management will depend on transforming legal protection into active and measurable conservation practice.

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