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THE INFLUENCE OF BIOTIC FACTORS ON THE AESTHETIC, FUNCTIONAL AND ECONOMIC ISSUES OF GREEN SPACES IN PITESTI

Mihaela Ileana Oprea [1,*]

[1] University of Pitesti, Faculty of Sciences, Physical Education and Computer Science, Pitesti, Romania

Abstract
This case study aims to highlight the influence of some direct biotic factors (dogs, man, birds) on the integrity of green spaces in the Pitesti city centre during three consecutive years: 2014, 2015 and 2016. Observations on the appearance of the affected areas were carried out, as well as determinations on: the number of destroyed/stolen floral plants (units) and the degraded/destroyed area of green space (sqm), by the biotic factors studied. The total percentage of losses was determined and the costs generated by the restoration of affected areas were assessed.

Keywords: flowers, lawn, degradation

1. INTRODUCTION

During 1966-1990 Pitesti distinguished itself through the landscape conceptions approached in creating an aesthetic and functional environment, which would favourably solve the interaction between the anthropic factor and the natural frame.

Over the past 20 years, urban rehabilitation projects have contributed to the introduction of structural and functional elements that have resulted in dysfunctions between natural and/or anthropic elements, tensions between protected areas and urban expansion, landscape design and arrangement errors, degradation of the patrimony elements, increasing vulnerability and altering or even destroying landscape values that improve the urban comfort and quality of life. In the urban area of Pitesti, a number of biotic factors have been identified that cause significant damage to the green spaces, both quantitavely and qualitatively, damaging the notion of "beauty" and "unity of composition" by disorganizing the elements of the ensemble (Iliescu, 1998). For decorative rendering of these areas, additional expenses are required from the municipality.

2. MATERIALS AND METHODS

Among the factors that affect the integrity of the green spaces in Pitesti city centre, we chose the direct biotic factors: dogs, doves and man, which in recent years have produced the most important and visible damage.

Observations and determinations were carried out over three consecutive years: 2014, 2015, 2016 and focused on seasonal floral compositions and lawns in central green spaces.

I. Observations on the influence of direct biotic factors (dogs, man, doves) on flowers and lawns.

*Corresponding author, E-mail address: opreamihaela_ileana@yahoo.com

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A) Damage caused by community dogs

Until 2015, when *Animal Welfare, Missing or Abandoned Animals and Animal Waste Management Service,* a department of SPEP (*Local Council Housing)* Piteşti (http://www.primariapitesti.ro, Annex to HCL 351/22.09.2011) started to work, the stray dogs used to dig holes into the green spaces, scatter the planted flowers, threaten the germination of the lawn, affecting the decorative features of floral plants and lawns (Figure 1).

Figure 1. Aspects of damage caused by community dogs

B) Damage caused by doves

Wild doves have been living more and more around people lately, and high buildings in heavily urbanized areas have become a real shelter for them. Among the population has become commonplace a habit of providing them permanently with solid food (grains), food scraps, in public places, in order to attract them to children. This has contributed to the radical change in the natural instincts of these birds, which normally feed on seeds, tree or shrub insects, more recently preferring lawn and floral plants. Following the attacks of these birds, whole lawn areas were degraded and the flowers of the floral beds, circles, arrangements, planters, etc. were devoured entirely (Figure 2). In addition, the fact that these doves can not be controlled from a health point of view is a source of disease spreading through scattered excrements.

Figure 2. Aspects of damage caused by doves

C) Damage caused by man

Human communities produce a series of actions with unfavorable impact on the image of green spaces (Mănescu, 2010), as shown also in Figure 3.

- negligent actions such as the storage of rubbish and debris in various places not intended for this purpose; postponing repairs to hot or cold water networks that lead to water

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spillage and implicitly to the degradation or destruction of vegetation in these places; washing cars near green spaces; throwing detergents or other toxic substances over flowers or lawns, damaging floral plants and decorative accessories (decorative pots, planters) on the occasion of artistic cultural events organized by the municipality;

- stealing planted floral material from decorative pots, planters, flower circles, arrangements or other floral compositions;
- damage caused by green spaces regeneration projects, made on non-reimbursable funds;

Figure 3. Aspects of damage caused by man

II. Determinations of damage caused by direct biotic factors (dogs, man, doves) on flowers and lawns.

Determinations have been carried out on: the number of destroyed/stolen floral plants; the degraded lawn surface; percentage estimation of total losses (%) and evaluation of costs generated by the replacement or restoration of affected areas.

3. RESULTS AND DISCUSSIONS

A. The results obtained, expressed in the number of floral plants destroyed/stolen by the studied biotic factors (dogs, doves, man), are centralized in Table 1.

The recorded data indicate that most of the flowers were destroyed by community dogs in 2014 (7500 units), representing 15% of the total number of flowers planted in the floral compositions of the city center (50000 units). In 2015 and 2016, the destructive action of community dogs was diminished (6000 units in 2015 and 1980 units in 2016) due to the intervention of the *Missing Animals Management Service* set up in 2015. However, there is a worrying increase in the damage caused by doves, from 2500 units in 2013 to 4000 units in 2014, because no action has been taken

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in this regard. Also, human actions (damage/theft) tend to grow from 1173 unitss in 2014 to 1320 units in 2016.

Table 1. Record of floral plants, expressed in units, destroyed or stolen by the biotic factors studied in the three year observation

FACTORS / YEAR	DOGS	DOVES	MAN	TOTAL DAMAGE
	Destroyed flowers units	Destroyed flowers units	Destroyed/ stolen flowers units	Flowers units
2014	7500	2500	1173	11173
2015	6000	3600	1277	10877
2016	1980	4000	1320	7300

The evolution of the percentage of plants destroyed (%) by the observed factors (dogs, man, doves) in the three years of observations is graphically represented in Figure 4.

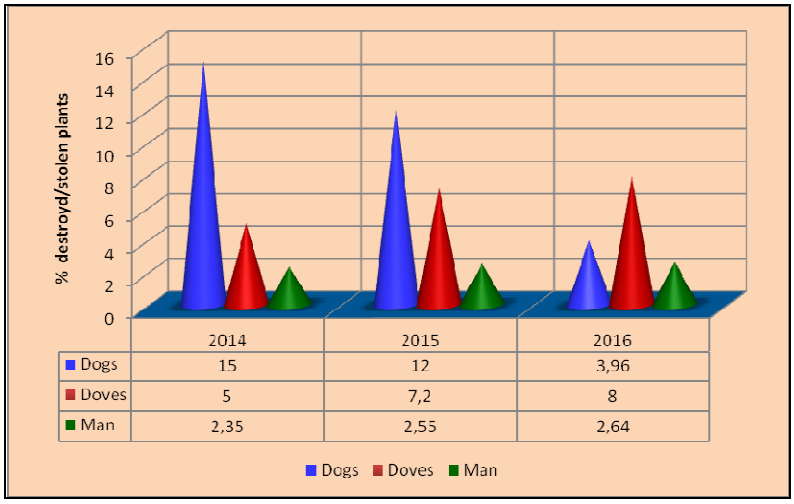

Figure 4. The evolution of the percentage of destroyed plants (%) under the influence of the biotic factors studied in the three years of observations

The percent estimation (%) of the total losses of floral plants following the action of the three studied factors in the three years of observations is shown in Figure 5.

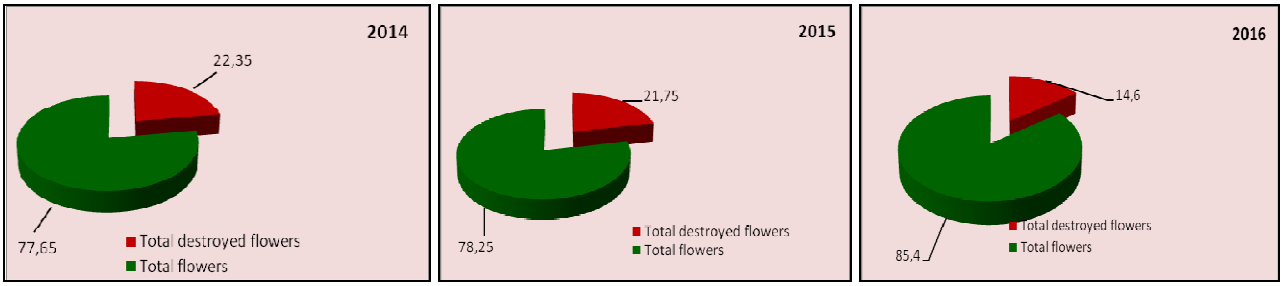

Figure 5. Percentage estimate (%) of total flower loss under the factors studied in the three years of observations

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B. Results obtained, expressed in sqm of degraded/destroyed lawn surface, under the action of the studied factors (dogs, man, doves) are centralized in Table 2.

Table 2. The evidence of degraded/destroyed green space (sqm) by biotic factors studied

FACTORS / YEAR	DOGS	DOVES	MAN	TOTAL DAMAGE
	Green space m^2	Green space m^2	Green space m^2	Green space m^2
2014	5000	2000	10000	17000
2015	3500	2500	20000	26000
2016	1000	3000	20000	24000

The results highlight the destructive action of the human factor on the lawns in the green spaces of general use during the development of urban regeneration projects. In 2015, the largest lawn area of 26000 square meters was destroyed, accounting for 26% of the total green area for the public, in the central area of the city. As in the case of floral compositions, there is an increase in the degraded lawn surface due to dove action, from 2000 sqm in 2014 to 3000 sqm in 2016 and a decrease in the damage caused to lawns by community dogs, from 5000 sqm in the 2013 to 1000 sqm in 2016, due to the measures taken in this respect by city hall representatives.

The percentage variation (%) of the degraded/destroyed lawn surface by the three observed factors (dogs, man, doves) in the three years of observations is graphically represented in Figure 5.

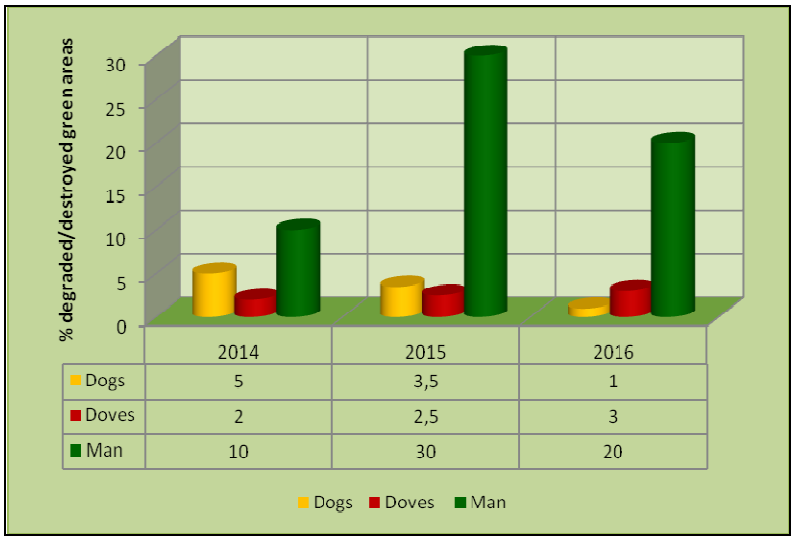

Figure 5. Percentage variation (%) of the lawn area destroyed/degraded by the biotic factors studiedd in the three years of observations

The percentage estimate (%) of total damage to lawns caused by direct biotic factors (dogs, man, pigeons) is shown in Figure 6, for the three years observation.

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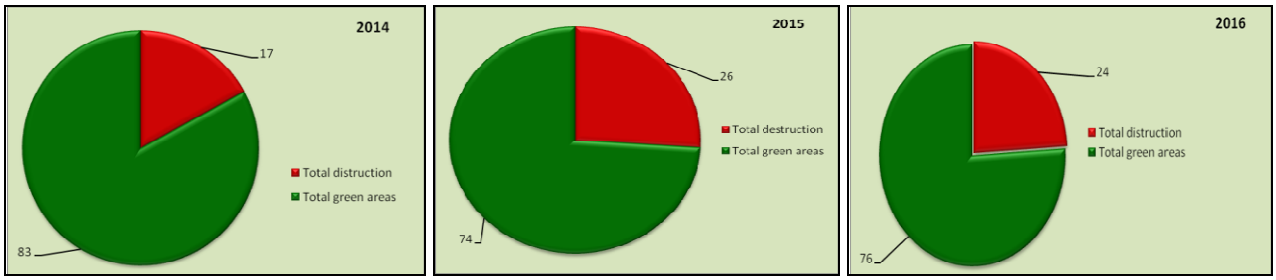

Figure 6. The percentage estimate (%) of total damage to the lawn by the biotic factors studied in the three years of observations

The costs of replacing or restoring affected areas caused by the factors studied in the three years of observations result from attached Estimate Works (Tabel 3-Tabel 8).

Table 3. Estimate Works for replacing the destroyed/stolen flowers – 2014

Item no	***Work name***	***U/M***	***COST***	***QUANT***	***Labor cost (lei)***
1	*Preparing the soil*	*10 sqm*	*19.704*	*45*	*886.68*
2	*Fine grinding of the soil*	*10 sqm*	*7.04*	*45*	*316.80*
3	*Finishing after leveling*	*sqm*	*1.182*	*450*	*531.90*
4	*Flower planting*	*100 units*	*33.436*	*111.73*	*3735.81*
5	***Total labor costs***				***5471.19***
6	***Total flower costs (1,2 lei/unit x 11173 units)***				***13407.6***

Table 4. Estimate Works for replacing the destroyed/stolen flowers – 2015

Item no	***Work name***	***U/M***	***COST***	***QUANT***	***Labor cost (lei)***
1	*Preparing the soil*	*10 sqm*	*19.704*	*43.5*	*857.13*
2	*Fine grinding of the soil*	*10 sqm*	*7.04*	*43.5*	*306.24*
3	*Finishing after leveling*	*sqm*	*1.182*	*435*	*514.17*
4	*Flower planting*	*100 units*	*33.436*	*111.73*	*3636.84*
5	***Total labor costs***				***53114.38***
6	***Total flower costs (1,2 lei/unit x 10877 units)***				***13052.40***

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Table 5. Estimate Works for replacing the destroyed/stolen flowers – 2016

Item no	***Work name***	***U/M***	***COST***	***QUANT***	***Labor cost (lei)***
1	*Preparing the soil for planting flowers*	*10 mp*	*19.704*	*29.2*	*575.36*
2	*Fine grinding of the soil*	*10 mp*	*7.04*	*29.2*	*205.56*
3	*Finishing after leveling*	*mp*	*1.182*	*292*	*345.15*
4	*Flower planting*	*100 buc*	*33.436*	*108.77*	*2440.82*
5	***Total labor costs***				***3566.89***
6	***Total flower costs (1,2 lei/unit x 7300 units)***				***8760***

Table 6. Estimate Works for restoring the destroyed/degraded lawn – 2014

Item no	***Work name***	***U/M***	***COST***	***QUANT***	***Labor cost (lei)***
1	*Preparing the soil*	*10 sqm*	*19.704*	*1700*	*33496.80*
2	*Fine grinding of the soil*	*10 sqm*	*7.04*	*1700*	*11968*
3	*Surface finishing*	*sqm*	*1.182*	*17000*	*20094*
4	*Lawn sowing*	*100 sqm*	*83.175*	*170*	*14139.75*
5	***Total labor costs***				***79698.55***
6	***Total lawn costs (680 kg x 14 lei/kg)***				***9520***

Table 7. Estimate Works for restoring the destroyed/degraded lawn – 2015

Item no	***Work name***	***U/M***	***COST***	***QUANT***	***Labor cost (lei)***
1	*Preparing the soil*	*10 sqm*	*19.704*	*2600*	*51230.40*
2	*Fine grinding of the soil*	*10 sqm*	*7.04*	*2600*	*18304*
3	*Surface finishing*	*sqm*	*1.182*	*26000*	*30732*
4	*Lawn sowing*	*100 sqm*	*83.175*	*260*	*21625.5*
5	***Total labor costs***				***121891.90***
6	***Total lawn costs (1040 kg x 14 lei/kg) - 2015***				***14560***

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Table 8. Estimate Works for restoring the destroyed/degraded lawn – 2016

Item no	*Work name*	*U/M*	*COST*	*QUANT*	*Labor cost (lei)*
1	*Preparing the soil*	*10 sqm*	*19.704*	*2400*	*47289.60*
2	*Fine grinding of the soil*	*10 sqm*	*7.04*	*2400*	*16896*
3	*Surface finishing*	*sqm*	*1.182*	*24000*	*28368*
4	*Lawn sowing*	*100 sqm*	*83.175*	*240*	*19962*
5	***Total labor costs - 2016***				***112515.60***
6	***Total lawn costs (960 kg x14 lei/kg – 2016***				***13440***

Estimation Works were prepared according to Annex 1 to H.C.L. 150/27.04.2017, on the approval of costs and prices for some activities carried out by S.C. Salpitflor Green S.A. Pitesti (http://www.primariapitesti.ro). The prices of materials are those practiced by S.C. Salpitflor Green S.A. Pitesti.

4. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- The biotic factors studied acted separately or combined, affecting the aesthetic aspect of some landscaped areas, the costs of replacing or restoring the affected areas rising in the three years of study to 97372.46 lei for the replacement of the seasonal flowers and 351626.05 lei for the restoration of degraded/destroyed lawns;
- The degradation/damage of seasonal floral plants and lawns by dogs, man and doves shows the lack of responsibility on the part of local administrative authorities in finding and implementing measures to stop these actions;
- Removing, starting with 2015, of 9500 community dogs, according to the data provided by the Pitesti City Hall Animal Rendering Service, caused a gradual decrease of the damage caused by them to floral plants, from 15% in 2014 to 3.96% in 2016 and from 5% in 2014 to 1% in 2016, on lawns
- The unnatural habits of the citizens (thefts, feeding doves and community dogs) affect the aesthetic image of green spaces;

RECOMMENDATIONS

- More promptness from local administrative authorities to take measures and oversee their application, to reduce the destructive potential of direct biotic factors (dogs, doves, man) and reduce the costs of restoring the affected areas;
- Promoting education, with a special emphasis on developing civilized behaviour among citizens and an attitude of respect and appreciation for the landscaped areas;
- Apply sanctions, in accordance with legal regulations, to citizens that cause damage/theft in

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green areas for the public;

- Better collaboration between green spaces maintenance staff and representatives of the local authorities to support the aesthetic and functional nature of the green spaces;
- Consultation of landscape specialists in the design and implicitly in the greening of urban regeneration projects.

5. REFERENCES

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