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Functional and aesthetic approach to design of bird feeders

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Abstract. Anthropogenic objects which load the urban environment negatively affects the human psyche. The alternative is attracting elements of the natural environment into urban environment, of which some of the most frequently identified are birds. Attracting birds in the city is possible by means of feeders and artificial nests, however, both must be harmonious. The aim of this study is to analyze the essential functions of the feeders, and their integration into the environmental design and development of the city. On this basis an original feeder which is convenient for use by birds and attracts people's attention is developed. In this paper we apply comparative analysis of different types of feeders encountered in Tomsk, bird watching, and evaluate usability of different types of feeders from the position of their convenience both for birds and human beings. Historical-cultural analysis for determining features of the architectural and environmental design of Tomsk is carried out, the method allows us to solve engineering problems. In this study the feeder convenient for bird use is designed which blends harmoniously with the architectural design of Tomsk.

Keywords: urban environment, bird feeder, wooden architecture, birds usability.

1. Introduction

Technogenic progress is deeply embedded in the life of modern man and in the space around leaving fewer and fewer places to nature. The evolution peak of the urban environment is perhaps the urban areas where the natural environment is absent or is under the control of the human being. On the other hand the human being is also a part of the nature and anyway needs communication experiences with it.

In particular throughout the world there is a tendency to attract animals which are usually birds as the most prominent representatives of the animal world. They always attract attention and arouse interest among residents of the cities [1]. Besides the creation of parks, recreational areas, there are other ways to attract wildlife particularly bird feeders are probably an integral part of modern urban environment[2]. Animals` attraction is possible when offer them resources to meet the vital needs, particularly birds feeding in winter is an important necessity in the life of the bird on the one hand, and a big step for rapprochement between man and nature on the other. Feeding allows birds survive in unfavorable period of

the year by means of the availability of food resources and hiding place. Popularity of the alone "window" feeders which are hung on the windows in the winter is an average of 1 pc. / 110 windows (Tomsk). At the same time they are used by 14 species of birds besides the typical Sinanthropus (dove, house sparrow, tree sparrow) includes species such as: great tit, bullfinch, waxwing, coal tit, willow tit, great spotted woodpeckers and gray-headed woodpeckers. In addition feeders indirectly attract birds of prey, sparrow hawk and black kite purposefully appear around them hunting for feeding birds. The ease of fabrication of the feeders and the ability to use the most common materials [3] contribute to their wide variety, in fact it`s difficult to find two of the same through. However under the conditions of the urban environment the feeder besides its direct function of attracting birds performs an equally important role in the provision of aesthetic perception of the environment.

The purpose of research is to develop and offer a bird feeder that would be useful not only for birds but also would be easy to use by human being, and perfectly blend in urban environment of Tomsk.

2. Research

Different types of original feeders are used in Tomsk in winter for the birds feeding among the variety of which there are several major types:

1. Window feeders for frequent use which hang out of the window openings and destined for birds feeding from the apartments and premises. These feeders are usually made from scrap materials and compact, adapted for mounting in the window opening.

2. Street feeders for general use, designed for use by a wide range of people. Such feeders are usually arranged in trees or on man-made elements and are freely available to people (Fig. 3, 4). This is the largest group of feeders, which includes a wide variety of shapes and sizes of containers for food. Usually they are also made from scrap materials.

3. Design feeders. The smallest group of feeders intended for use as a window opening and on the street. These feeders are characterized by original design solutions, the use of hard-treated materials. In general, the production of this type of feeders takes significantly more time and effort than first two types figure 1 and figure 2.

In the whole the analysis has showed that the most frequently used material for the manufacture of feeders is plastic containers (about 83%). In recent years cardboard feeders become to give way significantly to plastic (14%) because of its fragility. Least of all the feeders made of wood and other "designer" materials can be meet (3%) [4]. At the same time these are the feeders that attract people more from an aesthetic point of view and here there is a wide field for creativity from the perspective of material selection, formation, function and so on. Due to the popularity of bird feeders in the – just because of design decisions in designing and manufacturing there is an opportunity to improve visually the aesthetic appearance of the city and not only attract birds but also fit harmoniously into the overall appearance of the feeders.

Considering the specificity of Tomsk architecture it is advisable to offer design feeders associated with motifs of wooden ornaments and because the city is known primarily for its old wooden architectural structures. The small area of the city as a whole ($300m^2$) and compact construction are preserved wooden houses of the old buildings of the XIX century. Some of them are residential and some restored and compose the part of the museum complex - the monuments of wooden architecture. In the city there are a large number of old stone buildings built in XIX-XX centuries and made in the style of the Siberian baroque and classicism. For the moment the city has more than 700 buildings which are architectural

monuments and the "hallmark" of the city [5,6]. Using the tree in the structural elements of the feeder it emphasizes the stylistic specificity of Tomsk integrating wooden ornaments in urban design elements feeders. The most typical of them and the possibility of their use in functional design of feeders:

1. Wooden openwork ornament is one of the most visible and attractive element of carved wooden houses. In the design of the feeder the openwork lattice fence helps to protect the food from the blowing wind and in cold period such additional feeder becomes a shelter for birds. Openwork lattice prevents pigeon penetration into the feeder that do not provide food for smaller birds, openwork structures with different holes - cannot let in house sparrow which takes off other birds [7]. Openwork lattice most needful for use in outdoor rigidly fixed feeder. Openwork elements also look aesthetically as props in the construction of window feeders.

2. Bay windows and balconies bay type are quite spacious rooms that extend beyond the walls of the main building and balconies bay type, tend to be based on the porch and rely on massive props and have a large glass area. Such design solution is important for large rigidly fixed feeders placed on the balcony or on the trunk. In this case carved props or props with banisters provide a reliable basis for additional binding and several bay windows let birds feeding without interfering with each other.

3. The shape of the roof. The climate in Tomsk region is characterized by high humidity because fallout is significantly higher than the evaporation [6]. In this regard rational form of the roof is sloping roof with abrupt slope, so that in winter the snow did not stay on it. Abrupt slopes are reflected in the decorative turrets that adorn many homes of the city. Abrupt slopes of the roof will play the same role in design of the feeder as for real home and won`t let snow lay over, turret will serve as a convenient "handle", which is used to remove the entire roof or for fixing the feeder to a branch. The manufacture of such a roof would be done with the expectation that the snow is not rolled down on bird table which may hinder birds feeding or even make it impossible.

4. Protruding elements of the wooden ornament, spiers, jesting beams. Protruding elements are common for wooden architecture in general but if the wooden spiers can be seen in many houses then, for example, the stylized "wooden horse" has become the landmark of Tomsk wooden architecture. These elements in stylized form are relevant to all types of feeders, especially on the window where the birds can use them as perches and a longer time to linger near the window.

5. Openwork window frames are typical for wooden architecture in general. As for the design of the feeders openwork frame entrance can accentuate the aesthetic perception of the structure as a whole. It is important that the entrance in this case should be large enough and the ornament must not have sharp edges that could interfere bird feeding.

6. Log and cobbled walls. The walls of the feeder, neatly made of tiny bars or logs has already attracted the attention of the person and associates with wooden buildings. Using bars of different lengths you can create a comfortable environment for the birds` perch [8, 9].

Wooden feeders with elements of decorative carving are quite time-consuming to produce in comparison, for example, with simple feeders from plastic bottles or boxes, but their design and manufacture may be no less interesting creative process, which contributes to the development of children's sense of care and responsibility towards the environment in family or at school lesson labor [4].

Figure 1. Designer window-type feeder (Design Kukhta A)

Figure 2. Designer window-type feeder (Design Toichkin A)

According to the principles of aesthetic perception, and considering feeder from the position of birds usability we have proposed a number of parameters which satisfy the requirements.

1. The feeder should own a large margin of safety. With daily use, harsh weather conditions the feeder should retain sufficient strength.

2. The feeder should consist of durable materials that need a long time to withstand adverse weather conditions without loss of functional and aesthetic qualities.

3. The feeder should be suitable for use by birds so that it should provide a sufficient number of perches, hold a lot of food and thus hide it from adverse natural phenomena (wind, precipitation).

4. The feeder should be easy to use. Its design should be very simple, provides the convenience of adding food and at the same time it should be aesthetically good-looking not only for birds but also for the people. [3, 8].

3. Results and discussion

On the basis of the foregoing parameters the feeder was designed and constructed which satisfies necessary criteria. Figure 3 is a model made in the program SolidWORKS based on wooden architecture of Tomsk.

Figure 3. Feeder made after wooden architecture of Tomsk. (Design Fedorenko E)

The analysis has showed [10, 11] that the most effective material for the feeder is wood and plywood. This feeder has the following design solutions that provide the required functions of the feeders: bird watching, additional food for birds, operational and aesthetic functions are given in table 1.

Table 1. Design solutions that provide the required functions

function	construction
1. Observation function	
convenience of counting birds	There is one main approach to the feeders through the mainstream rectangular opening.
the possibility of observing birds from different angles	high perches for birds all the way around the feeder, viewed through transparent ornamental panels.
2. Functions of additional food:	
feed protection against weather elements	large gable roof with an angle of 120 °.
protect food from the blowing wind	skirting around 30mm high and ornamental panels on three sides.
eliminating undesirable use of feeders by synanthropic species of birds primarily rock pigeon	Box in the ornamental panels measuring 20x20 mm and smaller, high and thin perches, feeder location at a height from the ground which hinders its use by pigeons.
attract various species of birds, the use of different types of feed	a separate device - wooden pins 100mm in length pushed on the possibility of fat and other volume food items that can further attract woodpeckers and different kinds of tits.

3. Exploitation functions:	
providing servicing ease by means of removable fronted welt on the screws for adding feed and cleaning	Adding feed can be also made directly to the central box which allow completely pass the hand into the feeder.
4. Aesthetic functions:	
providing visual aesthetics associated with peculiarity of wooden architecture of Tomsk	Decorative side panels, perches, skating on the roof are made in the style of wooden ornament of Tomsk.

In such a way the proposed approach to the design of the feeder satisfies the required functions and is the subject of a harmonious urban environment corresponding to all the requirements of visual aesthetics associated with wooden architecture which became the architectural landmark of Tomsk. Recommendations and methods proposed in this study can serve as a basis for creating objects of environmental design for various purposes.

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