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**ECONOMIC AND ENVIRONMENTAL EVALUATION OF RECREATION
UNITS IN RESIDENTIAL DISTRICTS OF SAMARA
BY USING TOTAL ECONOMIC VALUE METHOD**

Shabanov Vsevolod Alexandrovich

Ph.D, Prof.,

Samara State University of Architecture and Civil Engineering, Russian Federation

Shabanova Anna Vsevolodovna

Ph.D., Associate Prof.,

Samara State University of Architecture and Civil Engineering, Russian Federation

One of the conditions of human life in the city is a sufficient number of recreational facilities. Among them an important place is occupied by recreation units in residential districts, which are used for daily and weekly resource types of recreation, especially by inhabitants relating to the category of citizens with limited mobility. This paper presents the economic evaluation of recreation units in residential districts by using the method of total economic value. The objects include a water body (pond) and as well as green area. There were determined the direct use value (cost of wood), as well as indirect use. There were taken into account the following functions of recreational facility components: water treatment, carbon dioxide sequestration and dust removing. There were compared the costs of direct and indirect use of recreational facilities. It was also shown the necessity to keep the visual impact of the recreational landscape with his assessment.

Keywords: *recreation units in residential districts, pond, ecological and economic assessment.*

Introduction. Urban recreational facilities represent an important resource for daily and weekly cycles of recreation. Their value becomes particularly evident during the crisis, when many citizens are deprived of the possibility of outbound tourism as the annual cycle of recreation. Moreover the city authorities are often burdened with recreation facilities due to their low yield. However they are rarely considered as the object of investigation and management. In recent years, many cities set up their program for the development and conservation of parks and other recreational facilities as elements of ecological framework of the city. On growing anthropogenic load on the one hand, and the lack of control on the other reduce the capacity and attractiveness of these very valuable for the city objects. The attempts to perform any valuations of urban recreational facilities are often reduced to the

determination of their cadastral value, thus indicating the lack of methodological base in this sphere.

Analysis of recent researches and publications. Model of sustainable development of recreational facility is a model of development in which a certain level of life quality can be assured. The process of forming of recreational facility development strategy includes as one of the stages diagnosis and follow up studies of economic, environmental and social factors [1]. The objects of the ecological and economic assessments in the published works of recent years are typically suburban recreational forests [2], or protected areas [3].

Previously unsettled problem constituent. At the present there are three methods of assessment of recreation facilities: general economic valuable method, replacement cost method and hedonic pricing method. However in relation to the city's recreational facilities, especially characterizing by little space and a modest variety of natural resources, they acquire some features.

Main purpose of the article. The purpose of this paper is to attempt to apply the total economic value method to the environmental and economic assessment of recreation units in residential districts on the example of Samara.

Results and discussions. For the study we selected two recreational facilities, including ponds and green spaces. Both ponds were established on ravines on similar technologies. This allows one to assume conditionally equal to their replacement cost.

First of research facilities located on the Novovokzalnaya Str./ Karl Marx Str.(Samara) [4]. Pond has a length of 60 m, width 35 m, average depth – 1.5 m. Green areas are presented poplars (3 pc.), willows (9 pc.), maples (26 pc.), elms (15 pc.). The pond was created in the XIX century aiming to supply with water villagers of Tomashev Kolok [5]. It is Located among low-rise housing [6].

The second object is located in the town of Zhiguliovsk (Samara region) on the territory of the park 40th anniversary of the Komsomol [7]. Pond has a length of 105 m, width 42 m. Green plantings are presented with poplars (174 pc.) and birch (13 pc.).

General method involves taking account of the economic value of the cost of direct use, indirect use and non-use.

Table 1 – Characteristics of recreational facilities

	Novovokzalnaya Str./ Karl Marx	Zhiguliovsk
Total area, ha	0,7	1,2
Area of the pond, ha	0,2	0,5
Area of shallow water, ha	0,04	0,05
Area of green spaces, ha	0,3	0,7

Baseline:

- calculating the direct use of the price of 1 m³ of firewood is taken to be 1.4 thousand rubles (according to open sources in 2013);
- calculating the annual carbon sequestration: sequestration of carbon dioxide 1 hectare green space – 8 kg/h, the duration of the growing season – 5 months, the price of the deposit of carbon dioxide – 10 EUR/t, 1 euro = 45.8 rubles. (data of the Moscow Interbank Currency Exchange on 30.06.2014);
- calculating the water treatment functions: construction cost of artificial wetland assumed equal to 2 mil. rubles/ha;
- cleaning the air (dust removal): The number of captured dust for 1 hectare of green space – 50 t, cost of 1 t of dust removing by using industrial equipment such as cyclone – 1.5 thousand rubles/t.

Results are presented in Table 2.

Table 2 – To the calculation of the total economic value of recreational facilities

Components of total economic value	Novovokzalnaya Str./ Karl Marx Str.	Zhiguliovsk
Cost of the direct use, thousand rubles	296,8	1047,2
Cost of using indirect, thousand rubles, including:	12,35	111,5
– annual deposition of carbon dioxide, thousand rubles	21	49
– water treatment function, thousand rubles	80	100
– dust removing, thousand rubles	22,5	52,5
Total	420,3	1158,7

We also found it interesting to make a comparison of the structure of general economic value for these two objects. The results are shown in figure 1 and 2. Noteworthy is the fact that in both cases, a substantial share – from 71 to 84% – is the cost of the direct use of green space as firewood! Two environmental functions – annual deposition of carbon dioxide and dust removing – in both cases amounted to 4-5%. In the conditions of the city the last feature is of particular value. To increase its contribution to the overall value of the object some changes in the species composition of plantings should be made. Now they are represented only by deciduous species, which limits the deposition of carbon dioxide and dust removing by five months a year. Partly, within 50%, replacing them with evergreen, sustainable urban species [8], will make it possible to fulfill this function all the year round.

Water treatment function is 19% for the pond on the Novovokalnaya Str. and only 8% – for pond in Zhiguliovsk. The ability of higher aquatic vegetation (bulrush, cattail, etc.) to reduce the amount of suspended substances, oil and other pollutants is used in constructed. In urban settings, the attitude to the overgrown pond is negative. Therefore, the situation becomes paradoxical: the more effort are invested in landscaping of the pond and its surrounding area, the less water treatment capacity and, consequently, the more intense the process of pollution pond are achieved.

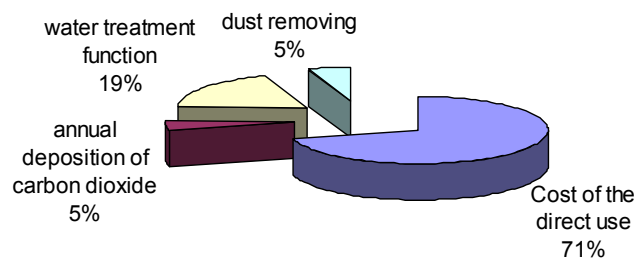


Figure 1 – Structure of the total economic value. Pond Novovokzalnaya Str. / Karl Marx Str., Samara

Among the functions that make up the cost of indirect use, we have not been taken into account improving function, i.e. a temporary reduction in days of disability for 3.5 days under the condition of outdoor recreation for 20 days.

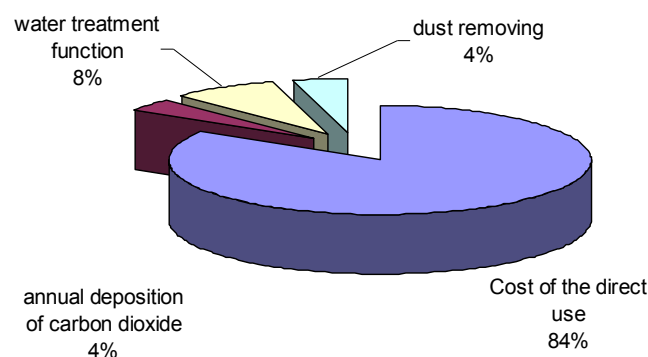


Figure 2 – Structure of the total economic value. Pond in Zhigulyovsk

City recreational facilities are important for the city and citizens not only for the functions named above. As part of the approach were not taken into account the

pleasure of communicating with nature, eco-educational and environmental education functions of such objects.

Conclusions and further researches directions. There were made environmental and economic assessments of urban recreation facilities that can become a part of the strategy of forming sustainable development of recreation units in residential districts. A necessary condition for obtaining adequate results is also taking into account the visual impact strength of recreational landscape, for example, using the rating scale of landscape expression [9], adapted to urban conditions.

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**ЕКОЛОГО-ЕКОНОМІЧНА ОЦІНКА ВНУТРІШНЬОКВАРТАЛЬНИХ
РЕКРЕАЦІЙНИХ ОБ'ЄКТІВ САМАРИ МЕТОДОМ
ЗАГАЛЬНОЇ ЕКОНОМІЧНОЇ ЦІННОСТІ**

Шабанов Всеволод Олександрович

*кандидат технічних наук, професор кафедри природоохоронного та гідротехнічного
будівництва, Самарський державний архітектурно-будівельний університет,
Російська Федерація*

Шабанова Анна Всеволодівна

*кандидат хімічних наук, доцент кафедри природоохоронного та гідротехнічного
будівництва, Самарський державний архітектурно-будівельний університет,
Російська Федерація*

Однією з умов життя людини у великому місті є достатня забезпеченість місцями відпочинку. Серед них важливе місце займають внутрішньоквартальні рекреаційні об'єкти, які є ресурсом щоденного та щотижневого типів рекреації городян, у тому числі тих, хто відноситься до категорії маломобільних громадян. У роботі виконана еколого-економічна оцінка двох внутрішньоквартальних рекреаційних об'єктів методом загальної економічної цінності. Об'єкти містять у собі водний об'єкт (ставок) і зелені насадження. Визначено вартість прямого використання (вартість деревини), а також непрямого використання. При цьому враховані наступні функції компонентів рекреаційного об'єкта: водоочисна,

депонування діоксиду вуглецю, пиловловлення. Проаналізовано внесок вартості прямого та непрямого використання. Відзначено необхідність врахування також візуального впливу рекреаційного ландшафту при його оцінці.

Ключові слова: внутрішньоквартальний рекреаційний об'єкт, ставок, еколого-економічна оцінка.

**ЭКОЛОГО-ЭКОНОМИЧЕСКАЯ ОЦЕНКА ВНУТРИКВАРТАЛЬНЫХ
РЕКРЕАЦИОННЫХ ОБЪЕКТОВ САМАРЫ
МЕТОДОМ ОБЩЕЙ ЭКОНОМИЧЕСКОЙ ЦЕННОСТИ**

Шабанов Всеволод Александрович

кандидат технических наук, профессор кафедры природоохранного и гидротехнического строительства, Самарский государственный архитектурно-строительный университет, Российская Федерация

Шабанова Анна Всеволодовна

кандидат химических наук, доцент кафедры природоохранного и гидротехнического строительства, Самарский государственный архитектурно-строительный университет, Российская Федерация

Одним из условий жизни человека в большом городе является достаточная обеспеченность местами отдыха. Среди них важное место занимают внутриквартальные рекреационные объекты, которые являются ресурсом ежедневного и еженедельного типов рекреации горожан, в том числе относящихся к категории маломобильных граждан. В работе выполнена эколого-экономическая оценка двух внутриквартальных рекреационных объектов методом общей экономической ценности. Объекты включают в себя водный объект (пруд) и зеленые насаждения. Определена стоимость прямого использования (стоимость древесины), а также косвенного использования. При этом учтены следующие функции компонентов рекреационного объекта: водоочистительная, депонирование диоксида углерода, пылеулавливание. Проанализирован вклад стоимости прямого и косвенного использования. Отмечена необходимость учета также визуального воздействия рекреационного ландшафта при его оценке.

Ключевые слова: внутриквартальный рекреационный объект, пруд, эколого-экономическая оценка.