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SOCIAL PERCEPTION AND THE USE OF ECOSYSTEM SERVICES ON MUNICIPAL POST-MINING LANDS. AN EXAMPLE OF SZACHTY IN POZNAN

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SPOŁECZNA PERCEPCJA I KORZYSTANIE ZE ŚWIADCZEŃ EKOSYSTEMOWYCH MIEJSKICH TERENÓW POEKSPLOATACYJNYCH. PRZYKŁAD SZACHT W POZNANIU

STRESZCZENIE: Zagospodarowywanie obszarów poeksploatacyjnych w miastach stwarza możliwość kształtowania struktury i poziomu świadczeń ekosystemów. Zarządzanie takimi obszarami powinno uwzględniać potrzeby mieszkańców miast i służyć podniesieniu jakości ich życia.

Celem artykułu jest ukazanie społecznej percepcji i wykorzystania świadczeń ekosystemowych Szacht w Poznaniu. W badaniach wykorzystano kwestionariusz internetowy, skierowany do użytkowników obszaru badań. Zebrane informacje pozwoliły określić cechy społeczno-ekonomiczne respondentów, przyczyny, dla których odwiedzają oni Szachty oraz poziom zadowolenia z obecnego zagospodarowania terenu. Uzyskane wyniki pozwoliły na sformułowanie rekomendacji dla decydentów w zakresie dalszego wzmocnienia potencjału Szacht do dostarczania świadczeń.

SŁOWA KLUCZOWE: świadczenia ekosystemów, tereny zurbanizowane, tereny poeksploatacyjne, ankieta internetowa, podejmowanie decyzji

Introduction

Built-up areas – as cities, towns and suburbs – provide a home to almost three-quarters of the European Union population and this number will further grow¹. The creation of a healthy, resilient and safe living environment for all citizens is the key task of urban policy and planning². To make cities more sustainable and better places to live, increasing urbanization should go hand in hand with attention to the proper design of the urban green infrastructure³. Significant opportunities for enriching cities with green infrastructure are created by development of post-industrial areas, especially post-mining ones. *If managed properly*, these areas can provide a broad bundle of ecosystem services (ES), such as *remediation of pollutants*, reducing noise, educational and aesthetic values, space for recreation and maintenance of social relations⁴.

The subject of this article is social perception and the use of ES by visitors of the post-mining Szachty area in Poznan. The inspiration for the research was a growing interest in the site from citizens and decision makers. This is expressed by a more and more intensive use of the Szachty area by inhabitants, which is accompanied by increasing public spending on site arrangement.

The main objectives of the study included:

- identification of ES in the Szachty area used by citizens;
- determination of the users satisfaction with the site's arrangement;
- provision of recommendations to decision-makers towards further strengthening of the ES potential of the site.

¹ Eurostat, *Statistics on European cities*, www.ec.europa.eu/eurostat [30-09-2016].

² European Commission, *Mapping and Assessment of Ecosystems and their Services – Urban Ecosystems*, Technical Report–2016–102, May 2016.

³ A. Chiesa, *The role of urban parks for the sustainable city*, "Landscape and Urban Planning" 2003 no. 68, p. 129–138; S. Buchel, N. Frantzeskaki, *Citizens' voice: A case study about perceived ecosystem services by urban park users in Rotterdam, the Netherlands*, "Ecosystem Services" 2014 no. 12, p. 169–177; C. Bertram, K. Rehdanz, *Preferences for cultural urban ecosystem services: Comparing attitudes, perception and use*, "Ecosystem Services" 2015 no. 12, p. 187–199.

⁴ e.g. K. Fagiewicz, *Obszary pogórnice jako typ krajobrazu recepcyjnego turystyki*, "Problemy Ekologii Krajobrazu" 2009 no. XXV, p. 95–103; N. Larondelle, D. Haase, *Valuing post-mining landscapes using an ecosystem services approach – An example from Germany*, "Ecological Indicators" 2012 no. 18, p. 567–574; S.G. Popović et al., *Models of Landscape Shaping in Exploited Quarries of Urban Area*, "Procedia Engineering" 2015 no. 117, p. 609–615.

Study area

The study area (Szachty) covers 114.1 ha and nearly all of it (113.8 ha) is located in the southern and western part of the city of Poznań in the valley of the Junikowo Stream (figure 1). A small fragment of the study area (0.3 ha) is situated within the boundaries of the town of Luboń. In Poznań, the study area is located within the boundaries of the Fabianowo-Kotowo, Świerczewo and Górczyn housing estates.

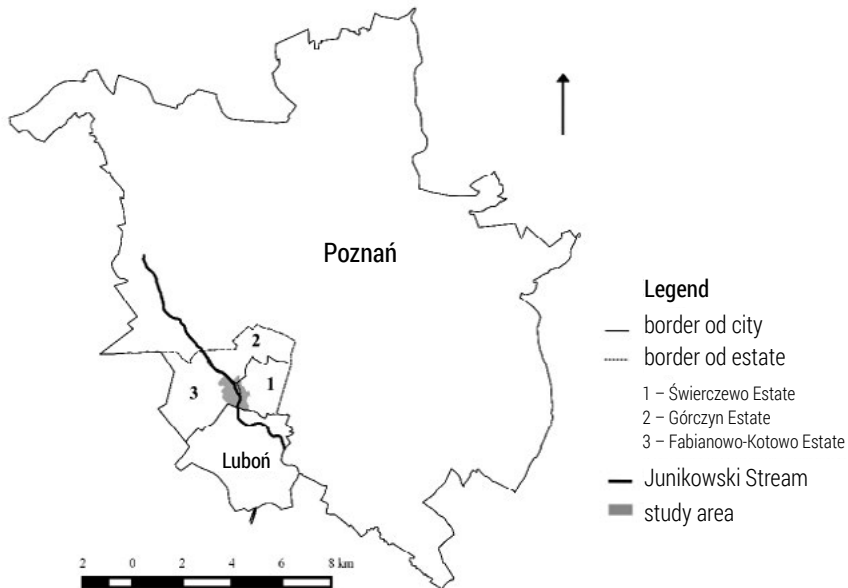


Figure 1. The location of the study area

The name Szachty comes from the German language in which the word “der Schacht” means “a shaft”. For over 100 years – from the 1830s to the end of the 1960s and the beginning of the 1970s – the extraction of ceramic materials, especially varved clays and tills, occurred⁵. Traces of former mining activities, determine the contemporary landscape of Szachty. Former clay pits, which have become filled with rainwater and ground water, are an

⁵ I. Markuszewska, *Funkcjonowanie oraz zagospodarowanie obszarów przemysłowych związanych z eksploatacją surowców ilastych ceramiki budowlanej*, “Krajobrazy Przemysłowe i Poeksploatacyjne” 2007 no. 6, p. 115–125.

important element of the land cover⁶. After the discontinuation of aggregate mining, the Szachty area was not subjected to reclamation actions. Instead, the natural succession of vegetation occurred here. The renaturalization process led to positive landscape changes, which are reflected by a mosaic of bodies of water, wetlands, grass vegetation and trees.

At present, the study area is a significant element of the green infrastructure in Poznań, which is one of five green wedges formed in river valleys⁷. It is mostly the city's inhabitants that cause changes in the landscape, as the Szachty area is for them a place where various forms of open-air rest and recreation are undertaken.

Methods

In order to achieve the adopted objectives, we conducted an online survey using local websites that gather the users of the Szachty area⁸. Studies on ES using surveys were conducted by numerous researchers⁹. Survey studies using the Internet are more and more popular due to their advantages such as easy distribution and completion of the questionnaire and lower costs¹⁰.

The survey was conducted from December 16th through 31st, 2015 and responses were obtained from 204 respondents. The survey covered the social and economic characteristics of respondents, the reasons why they visit the Szachty area, the ES used and the degree of satisfaction with the current site arrangement. While ordering the ES of Szachty identified by citizens, we used the Common International Classification of Ecosystem Services (CICES version 4.3¹¹). The selection of CICES resulted from its coherence with

⁶ I. Matuszyńska, *Zmiany użytkowania tereny jako element transformacji środowiska przyrodniczego na obszarze wybranych zlewni Poznania i jego strefy podmiejskiej*, Poznań 2001.

⁷ L. Poniży, *Tereny zielone na obszarze miasta Poznania*, in: I. Piotrowska, M. Cichoń (eds) *Człowiek w krajobrazie miasta Poznania*, Poznań 2010.

⁸ www.facebook.com/szachty; www.swierczewo.poznan.pl [20-10-2016].

⁹ A. Chiesura, op. cit.; P. Lupa, *Ecosystems' local recreational services valuation. Krajenka municipality case study*, "Ekonomia i Środowisko" 2012 no. 2(42), p. 209-222; S. Buchel, N. Frantzeskaki, op. cit.; C. Bertram, K. Rehdanz, op. cit.

¹⁰ D. Nulty, *The adequacy of response rates to online and paper surveys: what can be done?*, "Assessment & Evaluation in Higher Education" 2008 no. 33, p. 301-314; L. Peña, I. Casado-Arzuaga, M. Onaindia, *Mapping recreation supply and demand using an ecological and a social evaluation approach*, "Ecosystem services" 2015 no. 13, p. 108-118; S. Willcock et al., *Do ecosystem service maps and models meet stakeholders' needs? A preliminary survey across sub-Saharan Africa*, "Ecosystem Services" 2016 no. 18, p. 110-117.

¹¹ European Environmental Agency, *Common International Classification of Ecosystem Services v. 4.3*, www.cices.eu [30-09-2016].

recognized categorizations and concepts and the possibility of making future comparisons with results from other EU member states.

Results

Profile of the respondents

204 respondents took part in the study – 111 men and 93 women. With regard to age groups, persons aged 18–29 were the most numerous (89 respondents), and next were those aged 29–45 (68 respondents). Over a half of the respondents taking part in the study declared higher education (108 persons) and a further 70 respondents – secondary education (figure 2).

There are no data that would make it possible to assess the representativeness of the sample. The lower number of elderly respondents undoubtedly results from the fact that it is the age that most strongly determines the online presence and digital exclusion. *Despite that fact*, two-thirds of adult Poles regularly use the Internet (i.e. at least once a week)¹². For this reason, in the authors' opinion, the research conducted can be treated as a source of precious information about social perception and the use of ES in the study area.

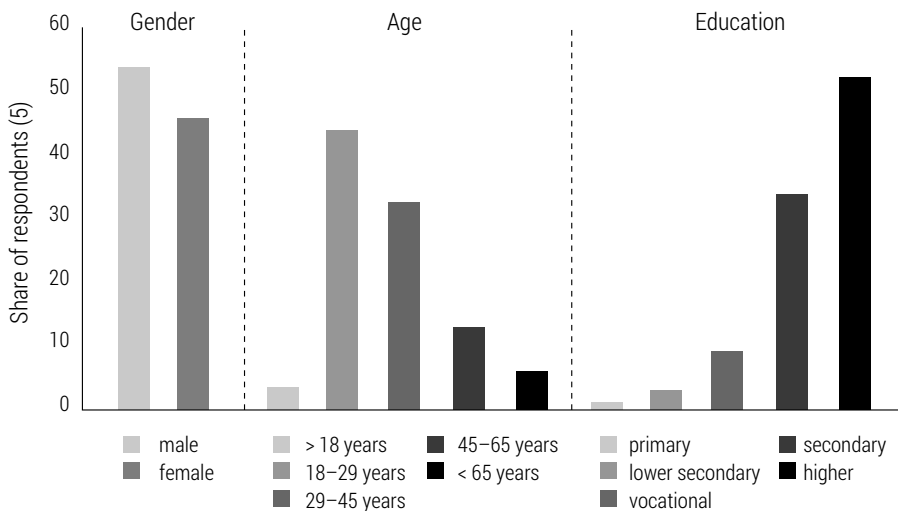


Figure 2. The structure of respondents according to the sex, age and education

¹² Centrum Badań Opinii Społecznej, *Internauci 2015*, www.cbos.pl [30-09-2016].

Reasons for choosing the Szachty area as a place of recreation

As the reason for choosing the Szachty area as a place of rest and recreation, the respondents usually quoted proximity to the place of residence (180 persons). It should be noticed that a total of 28.3 thousand people live in Poznan housing estates that are directly adjacent to the study area, and the Szachty area itself is relatively easy to reach owing to a well-developed network of roads, including bike paths and the proximity of public transport stops.

Very important reasons for the users of the Szachty area include its wild plants and animals (154 responses), the presence of water (138 responses) and less polluted air as compared to the surrounding area (96 responses). These values result from renaturalization of the landscape, which occurred after the discontinuation of aggregate mining. The presence of small infrastructure objects facilitates the exploration of the ecosystem (96 responses). Every fourth respondent indicated the importance of actions promoting Szachty undertaken by the housing estate council for their choice, while every fifth respondent mentioned the absence of alternative places for rest and recreation in the neighborhood. Furthermore, 16 respondents indicated other reasons including semi-natural landscape, space for meeting family and friends, peace and quiet as well as the sentiment mostly related to spending one's time in the Szachty area in the past.

The ecosystem services used by users

Respondents were asked to provide information about the manner and frequency of using the services listed in the questionnaire. The authors used closed questions. The selection of services proposed in the questionnaire resulted from the previous field reconnaissance, pilot study, conversations with users, scientific discussions and analysis of relevant literature¹³.

The responses show that the respondents use two classes of provisioning services, one class of regulating services and four classes of cultural services. The frequency of using particular ES is varied (figure 3). With regard to provisioning services, the respondents most often declared that during their visits to the Szachty area they catch fish, pick herbs, flowers and fruits (54 persons). This activity is seasonal. Nearly all respondents (201 persons) notice regulating service connected with improving the quality of air. However, respondents observe varied forms of cultural services to the greatest extent. This is related to the fact that inhabitants of nearby areas use Szachty as a place for rest and recreation. Respondents usually declared engaging in activities such as walking, socializing, admiring the landscape, observing

¹³ e.g. A. Chiesura, op. cit.; S. Buchel, N. Frantzeskaki, op. cit.; C. Bertam, K. Rehdanz, op. cit.

nature, drawing inspiration from nature, photographing, doing sports (e.g. cycling, jogging). From among cultural services, users more rarely undertook those that require certain infrastructures (e.g. barbecue, making a campfire) or pertain to activities undertaken by a specific group of users (e.g. recreational angling).

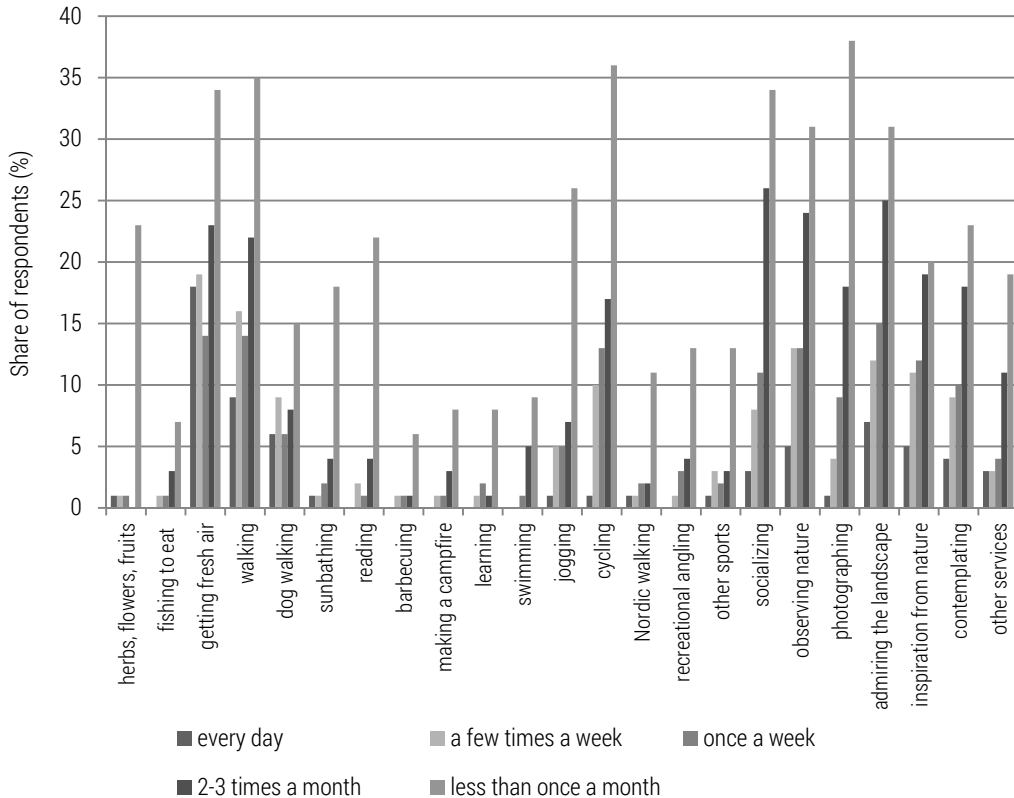


Figure 3. Ecosystem services of Szachty perceived by respondents

The range of impact of ecosystem services

The questionnaire contained a question about the place of residence of the respondents, assuming that it will indicate the range of impact of the identified ES.

The data concerning the distance of the respondents' place residents from the Szachty area is presented in figure 4. Nearly $\frac{3}{4}$ of the respondents live at a distance that is no more than 1 kilometre from the research area. In total, slightly more than 90% cover the distance of 3 kilometres or less to reach the Szachty area. Slightly over 95% of the respondents live in areas situated at a distance of 5 kilometres or less from the study area.

The results presented show that the Szachty area provides ES mostly on a local scale. Szachty users mostly reside in the southeastern part of Poznan, especially in the following housing estates: Świerczewo, Górczyn, Fabianowo-Kotowo, Grunwald Południe, Wilda and Zielony Dębiec (in total 137 respondents). The local range of impact of the Szachty services results from its small surface area, its peripheral location in the city and also the availability of other green areas, which are attractive for other inhabitants of Poznan, and its surrounding areas.

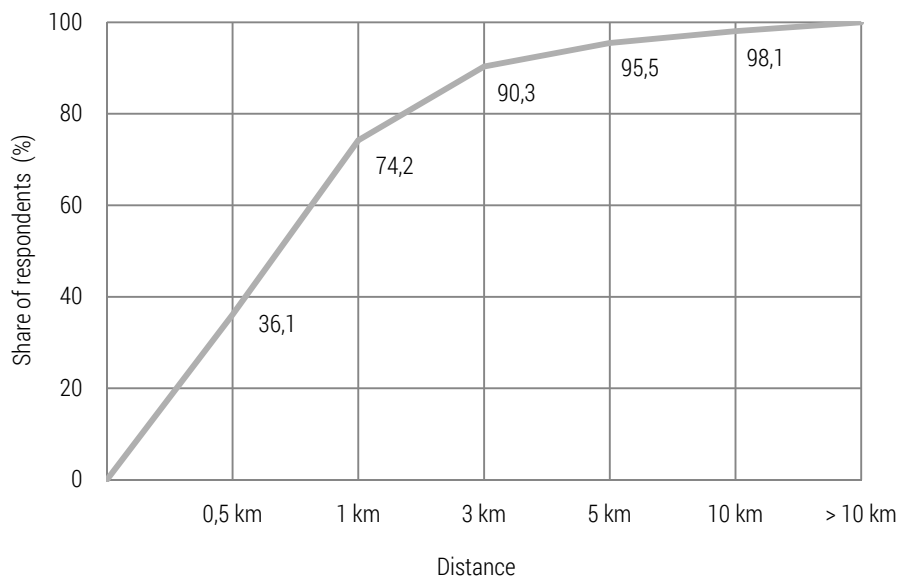


Figure 4. Distance from the place of residence of respondents to Szachty area

Current site's arrangement in the eyes of users

Ecosystem services do not flow directly from ecosystems to human well-being – their production takes place through interactions between the natural capital and the built environment (built capital)¹⁴. The existing infrastructure makes it possible to use ecosystems and thus draw benefits from them. In the presented research, respondents were asked to assign a positive, negative or neutral mark to the elements of the Szachty area development that have been created so far. The results show how highly the respondents value elements of small architecture such as waste bins, benches, signposts,

¹⁴ R. Constanza et al. *Changes in the Global Value of Ecosystem Services*, "Global Environ. Change" 2014 no. 26, p. 152–158.

paths (figure 5). Users attach less importance to investments enhancing regulating services, which include the construction of culverts between ponds. The lowest number of respondents marks positively the creation of a skatepark in the former brickyard and a private fishing ground at Nowakowski Pond. In the authors' opinion, this results from the fact that these last undertakings are targeted at a relatively narrow group of users.

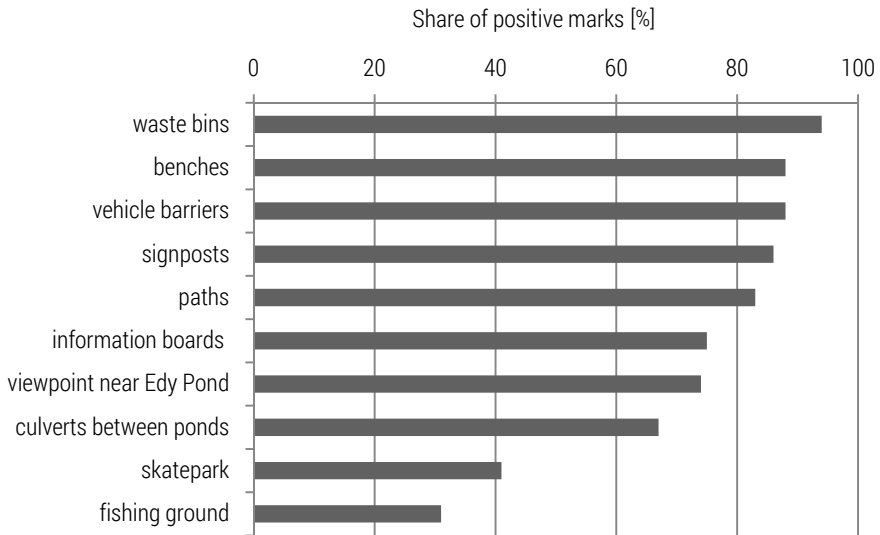


Figure 5. The percentage of positive marks for particular elements of the Szachty area development

Conclusions

The study shows that users of the Szachty area in Poznan perceive and use mainly cultural ES. Consequently, citizens appreciate these *elements of site arrangement*, which improve the place of rest and recreation. In turn, *less attention is paid* to investments enhancing the regulating services. The results allow us to provide recommendations to decision-makers towards further strengthening of the ES potential of the area. Fulfilling the demand for cultural ES should be addressed in the site's management. However, the enhancement of cultural ES could weaken the ecological benefits provided by the Szachty area; at present, regulating ES are overlooked by users. Therefore, *according to the authors*, the strengthening of the cultural ES should be accompanied by the safeguarding of regulating ES, both at the planning and project implementation stages. In particular, we recommend the implemen-

tation of tasks that enhance cultural services, but do not weaken regulating services (e.g. keeping the area clean on an ongoing basis, trimming trees, protecting the places of entry to Szachty against the entry of cars). With regard to tasks that enhance cultural services, and at the same time weaken regulating services, one must guarantee protection of the site's potential to provide the latter. For example, the construction of pedestrian and cycling paths or an observation tower should be accompanied with the care to maintain services such as life-cycle maintenance, habitat and gene pool protection, *mediation of pollutants*. We also recommend implementation of tasks that directly enhance regulating services. J. Borysiak & J. Markiewicz (2005)¹⁵ and A. Kaniecki (1995)¹⁶ drew attention to the necessity of reclamation of some ponds to regulate the trophy and eliminated the internal burden. It is also necessary to protect hydrotechnical devices that regulate the level of water in ponds. Last, but not least, strengthening of the cultural ES should be accompanied with education, which would increase the perception of ecological benefits from this area. The construction of educational paths will make it possible to inform users about regulating services provided by urban green infrastructure. Moreover, the organization of classes in Szachty by local schools and other educational institutions may play an important educational role.

The contribution of the authors in the article:

Małgorzata Stepniewska, Ph.D – 60%

Dawid Abramowicz, M.Sc – 40%

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¹⁵ J. Borysiak, J. Markiewicz (eds), *Weryfikacja granic terenów cennych przyrodniczo – byłych użytków ekologicznych Kopanina I i Kopanina II w celu wyróżnienia terenów predysponowanych do objęcia ochroną, z uwzględnieniem wprowadzenia w ich sąsiedztwie (teren ZKO) funkcji sportowej*, Poznań 2005.

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