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BENEFITS OF NATURE. A PILOT STUDY ON THE PERCEPTION OF ECOSYSTEM SERVICES

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KORZYSTANIE Z DOBRODZIEJSTW PRZYRODY. PILOTAŻOWE BADANIA DOTYCZĄCE PERCEPCJI KORZYŚCI PŁYNĄCYCH Z EKOSYSTEMÓW

STRESZCZENIE: W artykule zaprezentowano wyniki badań kwestionariuszowych przeprowadzonych wśród mieszkańców i turystów w wytypowanych miejscowościach gminy Nowinka (województwo podlaskie). Celem badań było określenie rzeczywistego korzystania z dobrodziejstw przyrody pochodzących z lokalnych ekosystemów oraz rozpoznanie poziomu wiedzy respondentów dotyczącej czerpania z nich korzyści. Zastosowano metodę door-to-door. Wskazano, jakie świadczenia ekosystemów są rozpoznawane i cenione przez lokalną społeczność oraz czynniki różnicujące poziom świadomości badanych i rzeczywiste wykorzystanie świadczeń na terenie badań.

SŁOWA KLUCZOWE: ankieta *door-to-door*, pytania otwarte vs pytania zamknięte, Suwalszczyzna i Ziemia Augustowska

Introduction

Human well-being depends on many services provided by nature including food, steady supply of clean water, recreation or protection from natural hazards etc. The state of the environment and the following ecosystem services supply are affected by human activities, which cause their damage and reduction or improvement and increase[1]. This strong connection seems to be widely-known to scientists but not to the general public[2]. In many cases benefits that people derive from ecosystems[3] or ecosystem processes[4] are taken for granted and people are unaware of their importance to them. This concerns for example water flow regulation, carbon sequestration or soil formation. Therefore, ecosystem values are not the most important in decisions relating to natural resources. To increase public awareness and participation in environmental decision-making, especially in regions with a significant share of protected areas, research on identification and valuation of ecosystem services among local communities have been undertaken[5]. Beside predominant economic valuation[6], noneconomic social valuation has been also commonly used in the decision-making processes[7]. Usually, it is based on social science methodology (individual in-depth interviews, questionnaires etc.)[8], because this way of collecting data shows satisfactory response rates[9].

[1] A. McMichael et al., *Linking Ecosystem Services and Human Well-being*, in: D. Capistrano (ed.), *Multiscale Assessments,* "The Millennium Ecosystem Assessment Series" 2005 no. 4, p. 43-60.
[2] R. Costanza et al., *The value of the world's ecosystem services and natural capital*, "Nature" 1997 no. 387, p. 253-260.
[3] MEA, *Millennium Ecosystem Assessment,* Washington D.C. 2005.
[4] R. Tirri et al., *Elsevier's Dictionary of Biology*, Amsterdam 1998; K.J. Wallace, *Classification of ecosystem services: Problems and solutions*, "Biological Conservation" 2007 no. 139, p. 235-246.
[5] C.M. Raymond et al., *Mapping community values for natural capital and ecosystem services*, "Ecological Economics" 2009 no. 68(5), p. 1301-1315; A. Pietrzyk-Kaszyńska, M. Grodzińska-Jurczak, *Ecosystem services perception. The example of local governments representatives in Małopolska voivodship*, "Ekonomia i Środowisko" 2012 no. 2(42), p. 83-90; G. Brown, J.M. Montag, K. Lyon, *Public Participation GIS: A Method for Identifying Ecosystem Services*, "Society and Natural Resources" 2012 no. 25, p. 633-651; N.S. Sodhi et al., *Local people value environmental services provided by forested parks*, "Biodiversity and Conservation" 2010 no. 19, p. 1175-1188.
[6] T. Żylicz, *Valuating ecosystem services*, „Ekonomia i Środowisko" 2012 no. 2(42), p. 18-38.
[7] M. Kumar, P. Kumar, *Valuation of the ecosystem services: A psycho-cultural perspective*, "Ecological Economics" 2008 no. 64(4), p. 808-819.
[8] C.M. Raymond et al., *Mapping community values for natural capital and ecosystem services*, "Ecological Economics" 2009 no. 68(5), p. 1301-1315; A. Pietrzyk-Kaszyńska, M. Grodzińska-Jurczak, *Ecosystem services perception. The example of local governments representatives in Małopolska voivodship*, „Ekonomia i Środowisko" 2012 no. 2(42), p. 83-90.
[9] G. Brown, *Mapping spatial attributes in survey research for natural resource management: Methods and applications*, "Society and Natural Resources" 2005 no. 18, p. 1-23; L. Tyrvainen,

This paper presents the results of questionnaire carried out among inhabitants and tourists staying in the selected localities of Nowinka commune (Podlasie voivodship). The aim of the study was to quantify the actual use of local ecosystem services and to examine respondents' knowledge and attitude towards benefits deriving from them. We investigated (i) which ecosystem services are recognized and valued in the community and (ii) what are the factors that differentiate respondents in relation to the level of awareness of ecosystem services and their actual use in the study area.

Methods

The pilot survey was carried out in June 2014 in Nowinka commune. This rural commune encompasses 203,84 km^2 located in Augustowska Plain (53°56′N, 22°58′E). Forests comprise over 63% of its area, while arable lands about 16% and grasslands over 10%. Lakes cover about 10%. Lands of great natural value exceed 84% of the area. The population density of the commune accounts for 14 inhabitants/km^2 [10].

The questionnaire was distributed by two researchers among residents and tourists staying in 16 villages of Nowinka commune. The method *door-to-door* was applied. In total, 117 questionnaires were collected back. The survey was anonymous. The questionnaire was divided into 3 parts. The first section comprised 4 open-ended questions concerning the use of local ecosystem services, the second presented the complex list of 45 ecosystem services with possibility to indicate the frequency of use, the last contained a set of socio-demographic questions regarding age, sex, education, source of income, place of residence etc. The scientific term *ecosystem services* was not used in the questionnaire. We replaced it by more colloquial and intelligible phrase *benefits of nature*.

Data from the questionnaires were entered into the computer and uploaded to the statistical program (SPSS ver. 17). Responses to open-ended questions were standardized in terms of writing and meaning and were transformed into binary variables. A set of socio-demographic variables were used for comparisons between subgroups. Pearson's chi-squared test was used as a test of independence to assess whether paired observations on two variables, expressed in a contingency table, are independent of each other (e.g. responses from people of different sexes to see if one's sex is related to the response). Pearson's chi-squared test (χ^2) was applied to evaluate how likely it is that any observed difference between the sets arose by chance.

K. Makinen, J. Schipperjin, *Tools for mapping social values of urban woodlands and other green areas*, "Landscape and Urban Planning" 2007 no. 79(1), p. 5-19.

[10] *Bank Danych Lokalnych* 2014, www.wroclaw.stat.gov.pl [20-09-2014].

Results

Respondents

Of 117 respondents interviewed, 65% were female and 35% male. The majority of them (58%) were between 30 and 60 years old, 21% were under 30 and about 20% were above 60. Most respondents reported having secondary (52%) or higher (41%) education. Farming, mental work or pension were the most frequent income sources among surveyed people. The study was carried out in the rural area. More than 66% of respondents were permanent rural residents, while 34% came from towns and cities. The majority of the respondents who declared themselves as urban permanent residents were second-home owners. Only few of them were short-term visitors.

Ecosystem services recognized and valued in the community

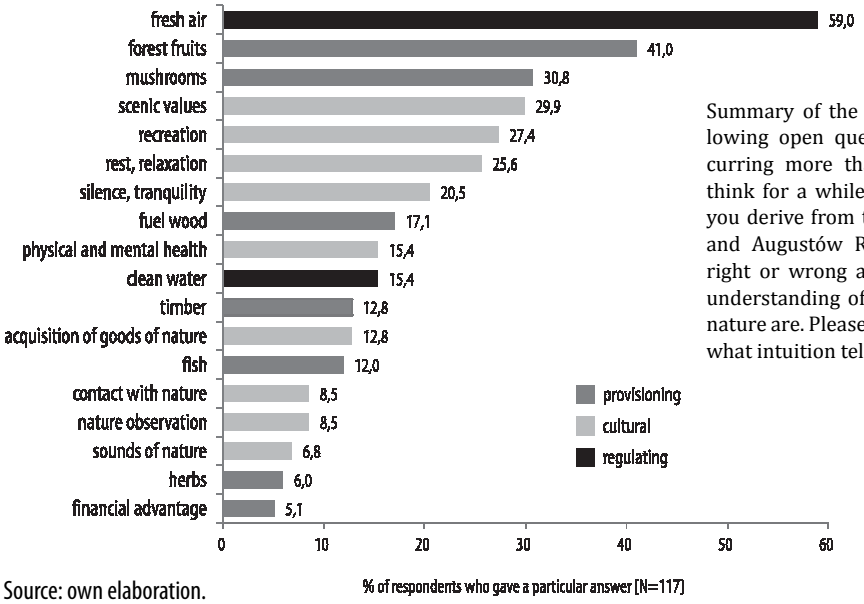
Fresh and clean air was the most frequently mentioned ecosystem service in respondents' answers to the general open question of the first section. It was followed by some provisioning services, like a supply of forest fruits, mushrooms and fuel wood, along with a set of cultural services e.g. scenic values, recreation, rest and relaxation, silence and tranquility (Figure 1). The between-group comparison showed different approach to ecosystem services among respondents, particularly when place of permanent residency was the grouping variable (Figure 2)[11]. In general, rural residents focused on provisioning services while urban residents paid more attention to cultural services. Interestingly, these differences did not occur when the real use of ecosystem services is considered.

Actual use of local ecosystem services

According to the results of the second section, obtained for the closed questions, actual use of local ecosystem services proved to be much higher than it was originally declared by respondents in open questions (Figure 3). Statistically significant differences between rural and urban residents in terms of actual use of services only occur in the case of fuel wood (χ^2=6,63; p=0,01).

[11] Other between-group comparisons showed that, for instance, women significantly more often mentioned herbs (χ^2=4,07; p=0,04) and contact with nature (χ^2=5,98; p=0,01) as benefits of nature. Better educated respondents listed generally more benefits. They pointed more often to scenic values (χ^2=7,64; p=0,02), health (χ^2=8,65; p=0,01), silence/tranquility (χ^2=6,85; p=0,03) and rest/relaxation (χ^2=11,35; p=0,00).

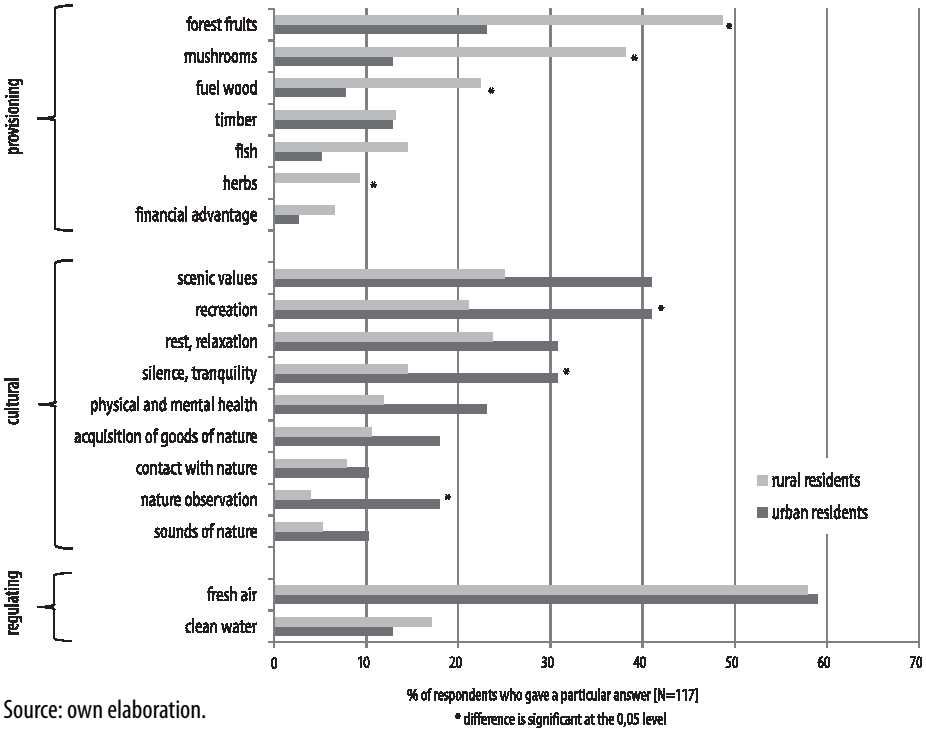
Figure 1
Benefits of nature recognized by respondents



Summary of the responses to the following open question (responses occurring more than 3 times): "Please think for a while and list the benefits you derive from the nature of Suwałki and Augustów Region. There are no right or wrong answers, good or bad understanding of what the benefits of nature are. Please respond according to what intuition tells you."

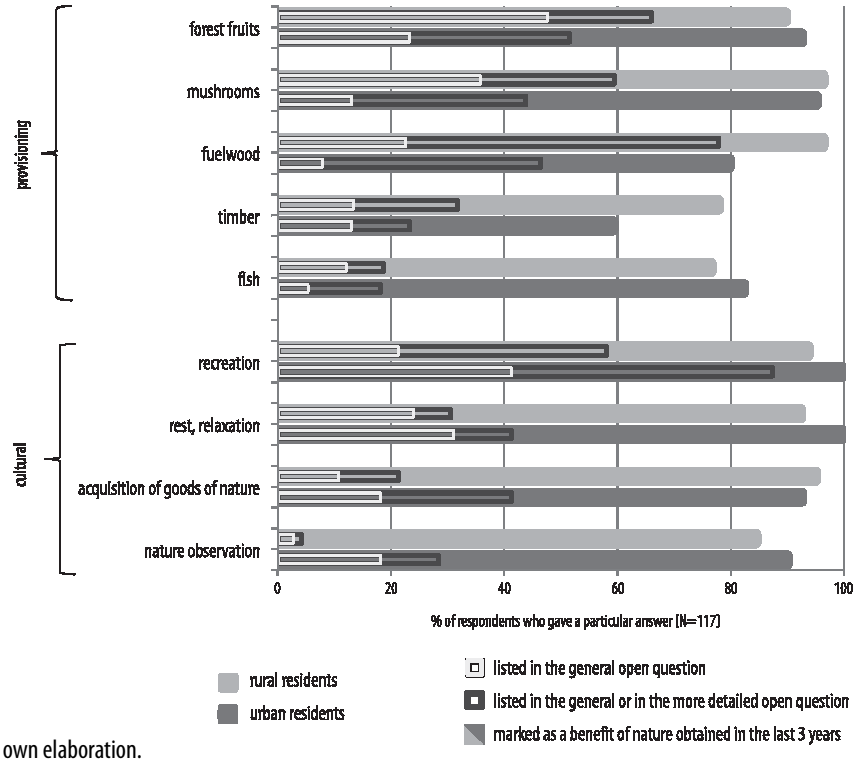
Source: own elaboration.

Figure 2
Benefits of nature recognized by respondents. Comparison between rural and urban residents



Source: own elaboration.

Figure 3
Responses to open and closed questions about the benefits of nature



Source: own elaboration.

Discussion and conclusions

Contrary to our skeptical surmise, shared by other researchers[12], local community has the capacity to identify benefits of nature and their use in the region. Our results are in line with the observations of Pereira et al., Sodhi et al. and Brown et al.[13]; the latter described wide knowledge about nature and a strong connection to the outdoors among participants of their study in Colorado.

[12] N.S. Sodhi et al., *Local people value environmental services provided by forested parks*, "Biodiversity and Conservation" 2010 no. 19, p. 1175-1188; J. Ghazoul, *Challenges to the uptake of the ecosystem services rationale for conservation*, "Conservation Biology" 2007 no. 21, p. 1651-1652; C. Kremen, G.C. Daily, A.M. Klein, D. Scofield, *Inadequate assessment of the ecosystem service rationale for conservation: reply to Ghazoul*, "Conservation Biology" 2008 no. 22, p. 795-798.

[13] E. Pereira, C. Queiroz, H.M. Pereira, L. Vicente, *Ecosystem services and human well-being: a participatory study in a mountain community in Portugal*, "Ecology and Society" 2005 no. 10(2), p. 14-36; N.S. Sodhi et al., *Local people value environmental services provided by forested parks*, "Biodiversity and Conservation" 2010 no. 19, p. 1175-1188; G. Brown, J.M. Montag, K. Lyon, *Public Participation GIS: A Method for Identifying Ecosystem Services*, "Society and Natural Resources" 2012 no. 25, p. 633-651.

Local people's awareness of nature's benefits largely correspond to the scientific knowledge developed under the concept of ecosystem services. Within answers to open-ended questions a wide range of ecosystem services was listed, including provisioning, cultural and regulating services provided by local environment (supporting services considered as processes necessary to provide most of the direct benefits). Fresh and clean air (regulating service) was the most frequently mentioned ecosystem benefit in respondents' answers. This result is in contrast to previous reports, which showed that identification of regulating services by non-specialists is a challenge[14], while cultural and provisioning services are directly experienced and intuitively appreciated[15].

Rural residents attach greater importance to material benefits of nature, while urban residents come to the study area primarily for cultural activities close to nature. The similar relationship is observed by Sodhi et al.[16]. They find that people with longer residency valued regulating and provisioning services provided by neighboring forests more.

Many researchers report that the background characteristics of respondents play a particularly decisive role in the perception of ecosystem services[17]. In our study, between-group comparisons based on variables other than the place of residency (e.g. age, sex, education, source of income) show surprisingly few significant differences in the perception and actual use of benefits of nature. Moreover, our respondents show slightly different preferences. For instance, Sodhi et al.[18] observed that people that were better educated valued more forest reserves for their regulating services. In our study, level of education differentiated the perception of some cultural values instead of regulating services.

The phrase *benefits of nature* proved to be adequate and useful as a keyword promoting the concept of ecosystem services and in social studies.

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[14] G. Brown, J.M. Montag, K. Lyon, *Public Participation GIS: A Method for Identifying Ecosystem Services*, "Society and Natural Resources" 2012 no. 25, p. 633-651.
[15] T. Plieninger, S. Dijks, E. Oteros-Rozas, C. Bieling, *Assessing, mapping, and quantifying cultural ecosystem services at community leve*l, "Land Use Policy" 2013 no. 33, p. 118-129.
[16] N.S. Sodhi et al., op. cit., p. 1175-1188.
[17] T. Dietz, L. Kalof, P.C. Stern, *Gender, values, and environmentalism*, "Social Science Quarterly" 2002 no. 83, p. 353-364; N. Suckall, E.D.G. Fraser, T. Cooper, C. Quinn, *Visitor perceptions of rural landscapes: a case study of the Peak District National Park, England*, "Journal of Environmental Management" 2009 no. 90, p. 1195-1203; T. Plieninger, S. Dijks, E. Oteros-Rozas, C. Bieling, *Assessing, mapping, and quantifying cultural ecosystem services at community leve*l, "Land Use Policy" 2013 no. 33, p. 118-129; D.B. van Berkel, P.H. Verburg, *Spatial quantification and valuation of cultural ecosystem services in an agricultural landscape*, "Ecological Indicators" 2014 no. 37, p. 163-174.
[18] N.S. Sodhi et al., op. cit., p. 1175-1188.