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COSTS AND BENEFITS OF CREATING AND MAINTAINING A STORK VILLAGE: CASE STUDY OF KŁOPOT (CYBINKA COMMUNE)

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KOSZTY I KORZYŚCI UTWORZENIA I DZIAŁALNOŚCI BOCIANIEJ WIOSKI NA PRZYKŁADZIE BOCIANIEJ WSI KŁOPOT (GMINA CYBINKA)

STRESZCZENIE: Bocianimi wsiami nazywa się miejsca kolonijnego gniazdowania bocianów białych. Takie miejsca stanowią atrakcję turystyczną, ponieważ jest to rzadkie zjawisko. Chroni się je nie tylko ze względu na możliwości rekreacji, ale także szereg innych kulturowych usług ekosystemów. W niniejszym artykule skoncentrowano się na wycenie ekonomicznej bocianiej wioski Kłopot nad Odrą, ze względu na dostarczane przez nią korzyści rekreacyjne. Posługując się metodą kosztu podróży, ustaliliśmy że wartość rekreacyjna Kłopotu wyniosła w latach 2002-2013 odpowiednio 1 671 183 PLN lub 3 369 321 PLN – uwzględniając lub nie uwzględniając koszt alternatywny czasu spędzonego przez turystów w podróży. Biorąc pod uwagę dodatkowe, relatywnie mniejsze korzyści uzyskiwane dzięki turystyce przez mieszkańców Kłopotu, a także – przede wszystkim – koszty utworzenia i utrzymania bocianiej wioski pochodzące ze środków publicznych, ustalono, że społeczna korzyść netto związana z funkcjonowaniem tej wioski w latach 2002-2013 wyniosła 1 197 554 PLN lub 2 895 692 PLN, odpowiednio uwzględniając i nie uwzględniając koszt alternatywny czasu spędzonego przez turystów w podróży.

SŁOWA KLUCZOWE: analiza kosztów i korzyści, efektywność ekonomiczna ochrony środowiska, ekonomiczna wycena usług ekosystemów, ochrona ptaków, turystyka ornitologiczna

Introduction

Cost–benefit analysis (CBA) is typically pursued when decision makers seek economic rationale for the decisions they are about to make. The basic logic of this approach is to compare the costs and benefits of a project in question, and to carry out this project only when benefits outweigh costs. CBA is widely used in environmental and health-care fields, where decisions are often particularly complex and involve important trade-offs.[1]

Our study treats CBA as an intellectual exercise, as there are few trade-offs involved when creating a stork village and there are other important motivations for this decision, rather than economic rationality. Stork villages attract tourists because of colonial nesting of white storks (*Ciconia ciconia*), a species of a particularly high cultural importance.[2] Therefore, a decision to create a stork village primarily depends on natural circumstances (whether there is a stork colony), and – secondly – on the willingness of the local stakeholders to carry out conservation activities and brand this colony as a tourist attraction. Only the latter may involve additional economic considerations that fit into the CBA logic, such as the costs of conservation activities and the related economic benefits.

The objective of this article is to test the economic efficiency of innovative nature protection measures, based on our case study of Kłopot, a stork village in the Odra River valley in Cybinka Commune in the west of Poland. It is one of the largest white stork colonies in Poland and probably also in Europe. The study area includes ca. 50 small farms located in the river valley, an area partly used as pastures, meadows and rarely as arable fields. The stork village "brand" was introduced to Kłopot in 2001 by the League for Nature Protection (LPN, *Liga Ochrony Przyrody*), a prominent Polish NGO, and investment started in 2002. Kłopot is a unique stork village in that it hosts a White Stork Museum (opened in 2003 and managed by the LPN), probably one of the two of its kind in the world (the other being in Kölked village in Hungary). Adjacent to the Museum is a hostel, also run by the LPN.

Kłopot is associated with a network of European Stork Villages coordinated by EuroNatur (although it is not a formal member). Local authorities and inhabitants of European Stork Villages are obliged to take active measures to protect storks, aiming "to enhance the living conditions of the white stork, such as preserving or rewilding large open wet meadows or erecting artificial stork nests" and to increase environmental awareness of inhabitants and visitors.[3] All of these activities translate into costs incurred by those who maintain a stork village.

Benefits related to stork villages are reflected in the broad satisfaction of their existence and in a more utilitarian ability to visit them by individual tour-

[1] R.J. Brent, *Applied Cost-benefit Analysis*, Cheltenham, UK and Northampton, MA, USA 2006.
[2] J. Kronenberg et al., *Znaczenie bociana białego Ciconia ciconia dla społeczeństwa: analiza z perspektywy koncepcji usług ekosystemów*, „Chrońmy Przyrodę Ojczystą" 2013 no. 69, p. 3-27.
[3] N. Wiesehomeier, G. Willinger, K. Grund, *European Stork Villages: where storks are honorary citizens*, Radolfzell 2014, p. 2.

ists. We approximate the latter category with the results of a travel cost valuation study, a method which is widely used to estimate the value of sites visited for recreational purposes. Additional benefits include the abovementioned economic opportunities related to the presence of tourists in stork villages (opportunity to sell goods and services).

Methods

We used a single-site travel cost model (TCM), based on data from an on-site sample of recreational birdwatchers visiting Klopot in 2011 and 2013. We used a single visitor as our unit of observation. We estimated a negative-binomial count-data TCM. We paid special attention to counteract potential biases introduced by on-site sampling: endogenous stratification (over sampling frequent visitors) and truncation (only observing visitors making at least one trip during the season).

The surveys were carried out from April to September and questionnaires were available to tourists in the White Stork Museum in Klopot, where local employees prompted the tourists to take part in the study. Every year about 1000 tourists visit Klopot. 119 complete questionnaires were collected in 2011 and 172 in 2013. In 2011 we used the same questionnaire to study the recreational value of another stork village, Żywkowo, and we encourage the interested readers to read more about the questionnaire and the specificities of the TCM that we used in an article that reports the results of that study.[4]

Here, we focus on the CBA, following a standard approach of seeking the net social benefit of a project. Both costs and benefits were calculated for 12 years: 2002-2013, i.e. ex post – since investment in the stork village was initiated until last year. The costs and benefits are discussed from an international perspective, taking into account that the village was also visited by foreigners and that foreign donors provided funds for its creation and maintenance. All amounts are expressed in 2013 prices, calculated with the use of the real, risk-free interest rate (our proxy of a social discount rate). We calculated the real, risk-free interest rate by subtracting the core inflation rate of the National Bank of Poland from the average yields of 10yr government bonds in each year.

The TCM-estimated recreational consumer surplus constitutes the most important benefit category. The other benefits accrue to the local community as a result of the inflow of tourists. We studied them in more detail, interviewing the more entrepreneurial inhabitants of Kłopot (shop owner, bee keeper, representatives of the LPN) about how much tourists contribute to their revenues.

Costs were calculated based on how much various external donors contributed to the establishment of the White Stork Museum and to creating the stork

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[4] M. Czajkowski et al., *The economic recreational value of a white stork nesting colony. A case of 'stork village' in Poland*, "Tourism Management" 2014 no. 40, p. 352-360.

village "brand" for Kłopot. These grants were mainly used to ensure the presence of the storks' breeding colony in Kłopot (conservation expenses) and to create the necessary infrastructure, both for storks (such as nest platforms) and for tourists (information boards etc.).

Unlike in some other CBA projects, we did not include the opportunity costs related to potential other land use options in the village (such as intensive agriculture). The main reason for this was that we would then also have to include various costs (including external costs) related to such activities, making this extension far broader than the core topic of our study.

Finally, other less tangible costs and benefits are only mentioned in passing where we found it impossible to calculate their value in monetary terms.

Results

Recreational benefits (consumer surplus calculated with TCM)

The expected number of trips taken by visitor n is given by: $\lambda_n = \exp(\beta_{TC}TC_n)$ which serves as our travel cost recreation demand function where TC_n represents individual n's cost of reaching the site. The trip cost was defined in two variants: with and without the opportunity cost of time; in both cases assuming a round trip. The average cost per kilometer was estimated at 0.45 PLN; however, when calculating cost per person we took a travelling party size into account. The value of time depended on visitor's origin and was assumed to be 8 PLN/h for Polish visitors and 16 PLN/h for foreigners (in both cases the value of time was assumed to be equal to 1/3 of an average hourly wage rate, which is a common practice in TCM studies). The average vehicle speed was assumed to be 60 km/h, and the mean distance traveled was 120 km (one way), (Table 1). The estimation results of two models are shown in Table 2 (assuming the opportunity cost of time to be zero) and Table 3 (assuming the opportunity cost of time to be one-third of an hourly wage). As expected, the coefficient of a trip cost was negative and statistically significant in both models.

In Table 4 we report welfare estimates along with sensitivity analysis over opportunity cost of time. Using zero cost of time instead of the 1/3 wage resulted in welfare estimates (consumer surplus associated with average respondents' visits) that are 50% lower than when the opportunity cost of time was taken into consideration: 186 PLN vs. 375 PLN; both welfare measures are expressed in 2013 prices. These results are very similar to those of another Polish stork village, Żywkowo in the north-east of Poland.[5] As Kłopot is visited by approximately 1000 tourists per year, this gives the net annual recreational benefit of 186 000 PLN (without value of time) or 375 000 PLN (with value of time).

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[5] Ibidem.

Table 1

Summary statistics of the basic explanatory variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Visit	291	1.872852	2.032745	1	21
Km	291	119.8282	156.6736	3	768
Cost	291	47.93127	62.66944	1.2	307.2
Cost1	291	92.0312	127.6177	2.16	768
Male	291	.3436426	.4757417	0	1
Age	291	42.48797	13.96902	15	80

Source: the authors' own elaboration.

Table 2

Estimation results of the individual travel cost model excluding the opportunity cost of travel time

Visit	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Cost	-.0053748	.0021756	-2.47	0.013	-.0096389	-.0011108
Cons	-20.25328	166.2862	-0.12	0.903	-346.1682	305.6617
Lnalpha	21.11985	166.2861			-304.7949	347.0346
Alpha	1.49e+09	2.47e+11			4.3e-133	5.2e+150

Truncation point: 0
Dispersion = mean
Log likelihood = -362.58645
LR chi2(2) = 8.40
Prob > chi2 = 0.0150
Pseudo R2 = 0.0114
Likelihood-ratio test of alpha=0:
chibar2(01) = 139.28
Prob>=chibar2 = 0.000

Source: the authors' own elaboration.

Assuming that these benefits are relatively constant over time, we can calculate the recreational value of Kłopot since tourists started to visit this place in 2003. In the first year about 600 people came, and since 2004 the village has attracted about 1000 tourists annually. Taking into account the real, risk-free interest rate (our proxy of a social discount rate), we conclude that the total recreational value of the village has been 1 671 183 PLN not including the value of time, and 3 369 321 PLN including the value of travel time.

Table 3

Estimation results of the individual travel cost model including the opportunity cost of travel time

Visit	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cost1	-.0026661	.001113	-2.40	0.017	-.0048476	-.0004847
cons	-21.8118	150.1269	-0.15	0.884	-316.0552	272.4316
lnalpha	22.66891	150.1266			-271.5739	316.9117
alpha	7.00e+09	1.05e+12			1.1e-118	4.3e+137

Truncation point: 0
Dispersion = mean
Log likelihood = -362.67787
LR chi2(2) = 8.21
Prob > chi2 = 0.0165
Pseudo R2 = 0.0112
Likelihood-ratio test of alpha = 0
chibar2(01) = 139.58
Prob>=chibar2 = 0.000

Source: the authors' own elaboration.

Table 4

Welfare estimates associated with visiting the stork village (consumer surplus per person per trip), [PLN]

Visit	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Excluding the opportunity cost of travel time						
nl_1	-186.0523	75.30889	-2.47	0.013	-333.655	-38.44958
Including the opportunity cost of travel time						
nl_1	-375.0731	156.5805	-2.40	0.017	-681.9652	-68.18096

Source: the authors' own elaboration.

Profits from tourism

The inhabitants obtained a new opportunity to earn money with the inflow of tourists, such as increased revenue of the local shop or revenues of other inhabitants who manage to sell their products or services to the LPN or directly to tourists. Occasionally, especially during bigger events organized by the LPN, the inhabitants could sell their produce and, in some instances, provide catering services. Assuming the average profit margin to be 25% of the revenue, the minimum net benefits from tourism for the inhabitants of Kłopot were 23 386 PLN over the period of 2002-2013 (2013 prices, discounted with the real, risk-free interest rate – our proxy of a social discount rate).

Costs of creating and maintaining the stork village

As a stork village is meant to serve public purposes, most expenses related to its creation and maintenance were paid from grants provided by various donors. These included both large international organizations (GEF/UNDP), important Polish funds (Regional and National Funds for Environmental Protection and Water Management), smaller organizations (Ciconia Stiftung, ProNatura), regional and local authorities, as well as private companies and individuals. External grants were used to fund all larger expenses related to the stork village, and often individual donors were approached when smaller needs emerged.

Altogether the various grants amounted to 497 015 PLN (2013 prices, discounted with the real, risk-free interest rate – our proxy of a social discount rate). Additional, current expenses were covered by the proceeds from educational services and accommodation offered by the Museum and the hostel.

Adapting the old school building for new purposes was particularly costly in the beginning and most costs were covered from the initial grants in 2003. Additional facilities had to be created, such as the storkwatching tower, hostel furniture, exhibits for the museum, bicycles for rental and other equipment (binoculars, computers etc.). White stork conservation activities included renovation of nests and nest platforms. Finally, the activity of a stork village requires education and promotion, which appeared as the annual Stork Day, youth exchange, information boards, posters, postcards etc. No costs of acquiring land were involved as the building and the land where the White Stork Museum, the hostel and the office are located are owned by Cybinka commune and are leased to the LPN free of charge.

In addition to the above costs incurred by the LPN, we were only able to identify negligible private costs incurred by one household which provided catering services and for some time offered accommodation. Also, private costs may be related to the fact that storks sometimes destroy (over time) roofs, either because of their heavy nests or because of their excrements. However, these problems can be prevented by proper maintenance of those nests which is included in the costs incurred by the LPN.

Net benefit of creating and running a stork village

In light of the above estimations, we can calculate the net social benefit of running and creating the stork village in Kłopot to be 1 197 554 PLN when using the lower (and less realistic) TCM estimate, and 2 895 692 PLN when using the upper (more realistic) TCM estimate. Note that these are mostly the broad public benefits that contribute to this result, which justifies the use of public funds for the creation and running of the stork village.

Discussion and conclusions

Based on an analogy to many other economically successful bird conservation undertakings which translated into local development opportunities,[6] LPN representatives saw similar opportunities in Kłopot. From the very beginning of this project, they suggested that the inhabitants of the village should undertake stork conservation activities (including the preservation of the storks' habitat) to attract tourists and thus generate economic benefits. Also, from the very beginning they ensured that the inhabitants have opportunities to earn money by providing catering services and selling their produce to tourists.[7] Their expectations only partly came true – there are fewer tourists and fewer income opportunities than the LPN expected.

The monetary benefits gained directly by the inhabitants do not compensate for the costs incurred by the LPN when establishing and maintaining the necessary infrastructure. However, these costs were paid with public funds (mostly from institutional donors) and they well reflected the broader interests of conservation. Public benefits estimated with the TCM indicate that establishing a stork village in Kłopot proved perfectly reasonable also in economic terms. Furthermore, white stork is a species that plays a prominent role in Polish culture[8] and nature conservation has broader objectives than just making profit.

Most environmental conservation projects are motivated by a broader – ethical and political – rationale, and our CBA only serves as an intellectual exercise. We need to keep in mind the different limitations of this approach: CBA is a typical economic tool, based on numerous assumptions characteristic of neoclassical economics, such as rational behavior of economic agents, ethical individualism, and a monistic utilitarian approach. Thus, critics suggest that CBA should be developed further and "acknowledge the multiple dimensions of human well-being, the plural forms of value articulation, the complex nature of ecosystems, the distributional biases of markets and the fairness implications of spatio-temporal framing"[9].

Indeed, our analysis revealed further, non-monetary benefits related to the stork village status of Kłopot. These include changes in environmental awareness of inhabitants and their positive attitude towards environmental conservation. This is partly motivated by financial benefits that they receive, but it is also a broader appreciation stemming from the fact that they see people coming from far away to see "their" storks. In terms of public benefits, this helps to shape the identity of the village. The identity – or rather an image – of the village also helps to raise further funds for environmental conservation or development of tour-

[6] C.f. D. Molloy, p. Thomas, P. Morling, *RSPB reserves and local economies*, Sandy 2011.
[7] L. Jerzak, P. Czechowski, *Rozwój turystyki przyrodniczej na przykładzie bocianiej wioski Kłopot*, „Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu" 2009 no. 50, p. 241-245.
[8] J. Kronenberg et al., op. cit.
[9] G. Wegner, U. Pascual, *Cost-benefit analysis in the context of ecosystem services for human well-being: A multidisciplinary critique*, "Global Environmental Change" 2011 no. 21, p. 492-504.

ism. Also, the village is an important site of ecological education for schools in the region.

The direct benefits related to running a stork village gained by the inhabitants can be larger, as demonstrated by an example of yet another stork village in Poland – Pentowo – which is run and managed as a business enterprise. Indeed, there are many opportunities to make stork villages more attractive to tourists, in line with the concept of sustainable tourism, so that those who visit this site have more opportunities to spend time and money there.[10] Thus, the management models of stork villages and other undertakings based on sustainable use of natural resources require further research.

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[10] J. Dziankowska et al., *Sustainable development strategy for the stork village Kłopot*, Łódź 2011.