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The assessment of economic indicators of National Park Administrations

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ABSTRACT: In the territory of the Czech Republic there are four national parks managed by their administrators. National parks are areas designed for the protection of nature and landscape, or biodiversity, i.e. rendering of public goods. National Park Administrations (NP Administrations) are specific organizations aimed at the provision of public goods; they are established by Ministry of the Environment of the Czech Republic and their activities are principally financed from the state budget. Since the main objective of these organisations is not the generation of profit, their economic indicators cannot be compared with those of other types of entities. The paper aims to assess selected economic indicators of organisations engaged in NP Administration. Attention was primarily focused on the most significant financial indicators for non-profit organisations – liquidity, i.e. the ability to pay. Data covered the time span of 2005–2012. The methodology used for research comprises time series modelling, calculation of correlation coefficients in combination with test of their significance, and individual simple indexes (base and chain ones). The results have drawn attention to the differences between national park administrations which are characterised, aside from nature conservation of a territory assigned by the state authorities, also by extensive economic activity, and those which were established purely for the purposes of nature conservation.

Keywords: economics; financial analysis; correlation coefficient; non-profit organisation

The authors' view on the issue of special protection areas can be divided as follows:

(1) Willingness to pay (entrance fees) – Togridou et al. (2006), Baral et al. (2008), Verbič and Slabe-Erker (2009), Baral and Dhungana (2014);

(2) Evaluation of management effectiveness or performance assessment => three directions:
   (*i*) application of a framework for assessing management effectiveness of protected areas (PA) – Hockings et al. (2006), Geldmann et al. (2015);
   (*ii*) how effective PA are with respect to biodiversity conservation – Wells and McShane (2004), Juutinen et al. (2011), Blicharska et al. (2011), Selby et al. (2011);
   (*iii*) cost-effective allocation of funds to achieve maximum conservation benefits – Hein et al. (2013).

(3) Dilemma – conservation and biodiversity or tourism – Berkes (2004), Ezebilo and Mattsson (2010).

According to Digital Register of the Nature Conservation Agency of the Czech Republic (DRNC 2015), the total area under protection in the Czech Republic is 1.28 million ha (16.2% of the territory). In the Czech Republic there are 4 national parks: Šumava National Park (Šumava NP), Krkonoše National Park (KRNAP), Podyjí National Park (Podyjí NP) and Bohemian Switzerland National Park (BSNP), which cover 119.5 thousand ha or about 1.51% of the territory. The main objective of national parks includes environmental protection, primarily the biodiversity (Ezebilo, Mattsson 2010).

Organisations whose main task is the management of national parks and protected landscape areas are directly involved in the promotion of a

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wide range of social functions associated with forests and landscapes as well as offering leisure time activities and education. These organisations are not designed to generate profit – their primary tasks are nature conservation and landscape protection, thereby contribution to an improvement of the life quality as it is required by the society (Březina et al. 2013). Their management is defined by Act No. 218/2000 on Budgetary Rules and by Act No. 219/2000 on the Property of the Czech Republic. Their accounting is governed by Decree No. 410/2009, implementing Act No. 563/1991 on Accounting.

The aim of the paper is to perform an assessment of selected economic indicators of the National Park Administrations in relation to the most important financial indicator for governmental non-profit organisations – liquidity, i.e. the ability to pay. The reference period covered the years 2005–2012.

The governmental non-profit organisations were not established for the purposes of profit generation, but they must be capable to pay its liabilities. The importance of the ratio indicator of liquidity used in financial analysis in a municipal company (entity linked to the state budget) was mentioned for instance by Kraftová (2002). We have learned from the available foreign and domestic literary sources that, as of yet, nobody has examined the development of economically significant variables (costs of services, personnel costs, revenues from the sale of own products and financial allowances for activities) per hectare of the national park using a linear trend with calculations of the correlation coefficient, testing the significance of the correlation coefficient and the application of individual simple indices in the indicators mentioned.

MATERIAL AND METHODS

Theoretical background. Šumava NP and Protected Landscape Area (PLA), KRNAP and Podyjí NP Administrations are self-governing entities (by legal form they are allowance organisations) with a source of financing in the form of allowances by the founder and generated revenues; a certain percentage of retained earnings of these entities can be transferred into special funds, such as reserve fund, asset reproduction fund, reward fund and fund of cultural and social development. The Bohemian Switzerland NP does not have a legal subjectivity (by legal form it is an organisational unit of the state), its source of financing is the state budget, all its revenues are revenues of the state budget, and it creates two funds – reserve fund and fund of cultural and social development.

Besides the delegated function of protection of the given territory Šumava NP and PLA and KRNAP Administrations are characterized by a wide range of business activities. On the contrary, Podyjí and Bohemian Switzerland NP Administrations were founded primarily for nature and landscape protection.

Basic characteristics of national parks and chosen economic indicators of Administrations (average values) for the reference period 2005–2012 are presented in Table 1.

The selected economic indicators were major cost items – personnel costs, service costs, and revenue

Table 1. Basic characteristics of national parks (NP) and chosen economic indicators of their Administrations (average values) for the reference period 2005–2012 (Nature Conservation Agency of the Czech Republic 2014; Ministry of Finance of the Czech Republic 2014a,b)

	BSNP	Podyjí NP	KRNAP	Šumava NP and PLA
Basic characteristics				
Area (ha)	7,933	6,276	54,969	68,339
Protection zone (ha)	0	2,822	18,642	99,664
Zone I (ha)	1,653	2,201	4,503	8,743
Zone II (ha)	6,210	2,282	3,416	56,742
Zone III (ha)	70	1,793	28,408	2,854
Economic indicators				
Number of employees	51	47	321	330
Revenues from transfers (thousand CZK)	71,379	37,341	207,775	247,897
Total extraction (m^3)	28,667	10,159	102,274	277,214
Revenues from own activities (thousand CZK)	24,047	9,858	107,693	261,897

BSNP – Bohemian Switzerland National Park, KRNAP – Krkonoše National Park, PLA – Protected Landscape Area

items such as revenues from own activities and revenues from transfers (i.e. operational grants). All indicators were recalculated to per-hectare values and plotted in line charts.

Materials. Data for analysis was taken from Profit and Loss Statements for the period 2005–2012. Data for the years 2005–2009 was obtained from the ARIS web portal (data presentation system of the IDB ARIS database). Data for the period 2010–2012 was downloaded from the Presentation system of Accounting and Financial Information of the Government (ÚFIS portal). Both information systems are available on the Ministry of Finance of the Czech Republic website. At the portal, it is possible to download financial statements of governmental non-profit organisations which were established by individual ministries. The latest data available on the Ministry of Finance of the Czech Republic portal was for the year 2012.

Methodology. By creating a line chart for the individual economic indicators for 2005–2012, the data was interleaved with different trends; it was found that the data show a linear dependence. Dependent variables were examined – selected economic indicators in different time intervals, where time was an independent variable.

The time series was decomposed to the trend component T which describes development of the time series. The authors used the linear trend function.

The Equation (1) for calculation of the linear trend:

$$T_t = a_0 + a_1 t \quad (1)$$

where:
a_0, a_1 – unknown parameters,
t – time (yr).

The Equation (2) for calculation of the correlation coefficient:

$$R = \sqrt{1 - \Sigma(y - \hat{y})^2}/[\Sigma(y - \overline{y})^2] \quad (2)$$

where:
y – measured value of the indicator,
$\hat{y}$ – model value of the indicator,
$\overline{y}$ – average of indicator values.

The test of the correlation coefficient significance (t_R) was performed by Eq. (3):

$$t_R = R \times \sqrt{n - 2}/\sqrt{1 - R^2} \quad (3)$$

where:
R – correlation coefficient,
n – number of measurements.

The null hypothesis (H_0) for this test argues that the correlation between variables is not provable in the base data file. The formula of the test criterion of significance of the pairwise correlation coefficient has Student's distribution with (n – 2) degrees of freedom. If $|t_R| > t_R$, $n - 2$ (critical value), then we reject H_0 (Drápela 2002). Test results were determined at the significance level $\alpha = 0.05$, i.e. the reliability of tests is 95%.

To observe the development of the most significant cost and revenue items on comparing 2005 with the remaining years (2006–2012) we applied the base index (i_b).

The Equation (4) to calculate the base index (Šafařík, Hlaváčková 2014):

$$i_b = q_n/q_0 \times 100\ (\%) \quad (4)$$

where:
q_n – indicator value in the n^{th} period,
q_0 – indicator value in the base period.

To observe the development of the most significant cost and revenue items between individual years (2005–2012) we applied the chain index (i_{ch}).

The Equation (5) to calculate the chain index (Šafařík, Hlaváčková 2014):

$$i_{ch} = q_n/q_{n-1} \times 100\ (\%) \quad (5)$$

where:
q_n – indicator value in the n^{th} period.

The actual calculation and graphical representation of results was performed in Microsoft Excel (Microsoft, Redmont, USA).

RESULTS

This part of the paper contains results of the research. The authors calculated correlation coefficients for individual economic indicators and tested their significance (Table 2). The development of economic indicators of NP Administrations was analysed via linear-trend time series modelling (Figs 1–4).

The results of significance testing of the correlation coefficients of NP Administrations' personnel costs are shown in Table 2.

The significance tests did not prove any statistically significant correlation in any of all NP Administrations. It is not possible to predict whether the trend in personnel costs will be decreasing or increasing in future years. The development of the personnel cost linear trend is shown in Fig. 1.

The item of personnel costs includes wage costs, social and health care insurance, creation of funds for cultural and social development and other per-

Table 2. The test of significance of the correlation coefficients of parameters of the National Park (NP) Administrations (critical value = 2.4469)

Administration	R^2	Test criterion
Personnel costs		
BSNP	0.5474	1.6024
Podyjí NP	0.1923	0.4800
KRNAP	–0.0265	–0.0649
Šumava NP and PLA	0.5088	1.4476
Service costs		
BSNP	0.9130	5.4819
Podyjí NP	0.0110	0.0269
KRNAP	0.6277	1.9749
Šumava NP and PLA	–0.0023	–0.0057
Own activities		
BSNP	0.9732	10.3621
Podyjí NP	0.5475	1.6026
KRNAP	0.6907	2.3393
Šumava NP and PLA	0.0977	0.2405
Transfers		
BSNP	0.7141	2.4988
Podyjí NP	0.7542	2.8136
KRNAP	–0.1799	–0.4479
Šumava NP and PLA	0.1290	0.3186

BSNP – Bohemian Switzerland National Park, KRNAP – Krkonoše National Park, PLA – Protected Landscape Area

sonnel costs. Development of personnel costs recalculated per hectare of protected territory can be estimated as constant for all analysed entities. Slight differences can be observed only in the case of the BSNP Administration. The largest share of personnel costs per hectare can be observed for the Podyjí NP Administration.

The results of significance testing of the correlation coefficients of NP Administrations' service costs are shown in Table 2.

The significance tests proved a statistically significant correlation only in one NP Administration. The increasing trend of service costs of the BSNP Administration will probably continue in the coming years. There was no statistically significant dependence identified in other national parks. It is not possible to predict whether the trend of service costs will be decreasing or increasing in future years. The development of the service cost linear trend is shown in Fig. 2.

The Bohemian Switzerland NP Administration has an increasing trend of costs for services, mainly for services connected with wood production. The other NP Administrations maintain their costs for services at constantly the same level. The year 2007 was an exception for Šumava NP and PLA Administration, where due to disaster caused by Kyrill storm there were higher costs of accidental extractions and other related services.

The results of significance testing of the correlation coefficients of NP Administrations' revenues from own activities are shown in Table 2.

The significance tests proved a statistically significant correlation only in one NP Administration. The increasing trend in revenues from own activities of the BSNP Administration will probably continue

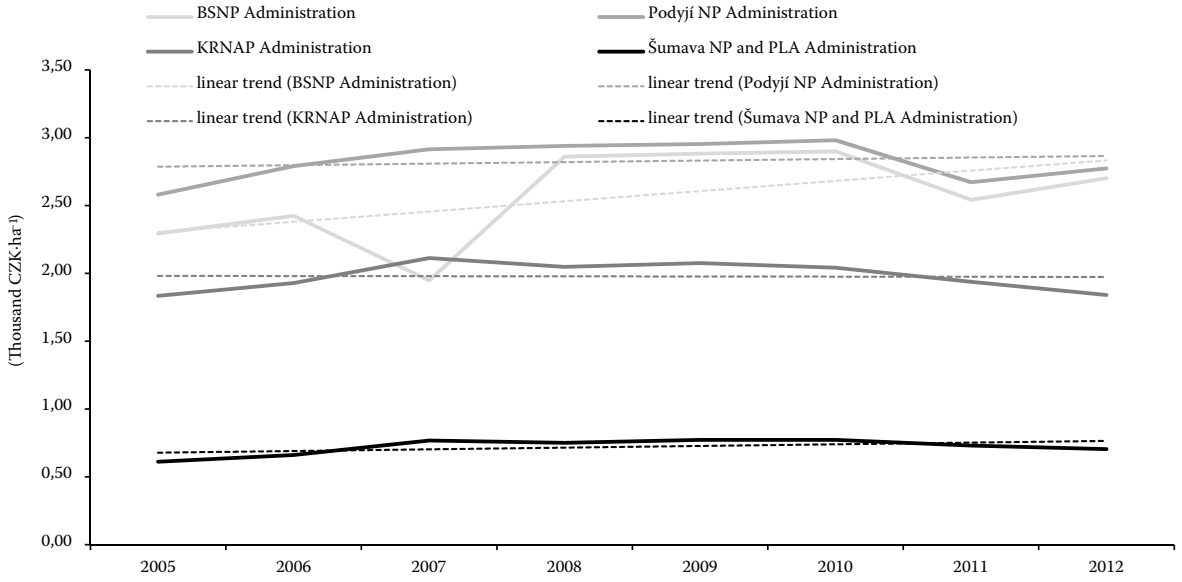

Fig. 1. The development of personnel costs (in thousand CZK) recalculated per hectare of the National Park (NP) area via a linear trend in the years 2005–2012 (Ministry of Finance of the Czech Republic 2014a,b)

BSNP – Bohemian Switzerland National Park, KRNAP – Krkonoše National Park, PLA – Protected Landscape Area

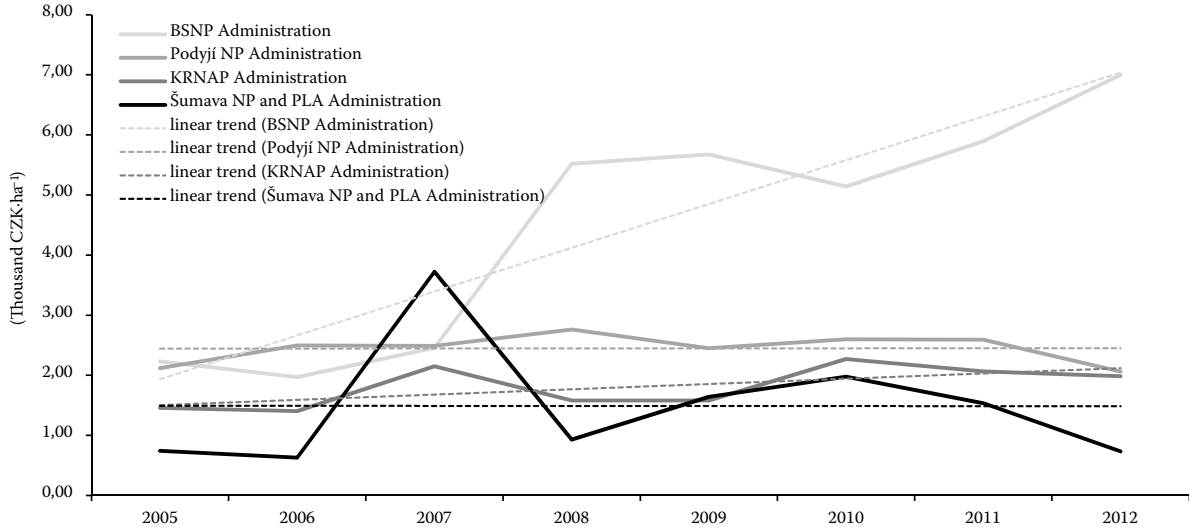

Fig. 2. The development of service costs (in thousand CZK) recalculated per hectare of the National Park (NP) area via a linear trend in the years 2005–2012 (Ministry of Finance of the Czech Republic 2014a,b)

BSNP – Bohemian Switzerland National Park, KRNAP – Krkonoše National Park, PLA – Protected Landscape Area

in the coming years. There was no statistically significant dependence identified in the other national parks. It is not possible to predict whether the trend of revenues from own activities will be decreasing or increasing in future years. The development of the linear trend of revenues from own activities is shown in Fig. 3.

The largest share of revenues from own activities is connected with sales of wood. The Bohemian Switzerland NP Administration had a growing trend of this indicator. The other NP Administrations maintained their revenues from own activities at constantly the same level. The year 2007 was an exception for Šumava NP and PLA Administration, where due to disasters there were higher accidental extractions and thus higher sales of wood.

The results of significance testing of the correlation coefficients of NP Administrations' revenues from transfers are shown in Table 2.

The significance tests proved statistically significant correlations in the Bohemian Switzerland and Podyjí NP Administrations. The increasing trend of operational grants to the Bohemian Switzerland and Podyjí NP Administrations will probably continue in the coming years. There was no statistically significant dependence identified in the other na-

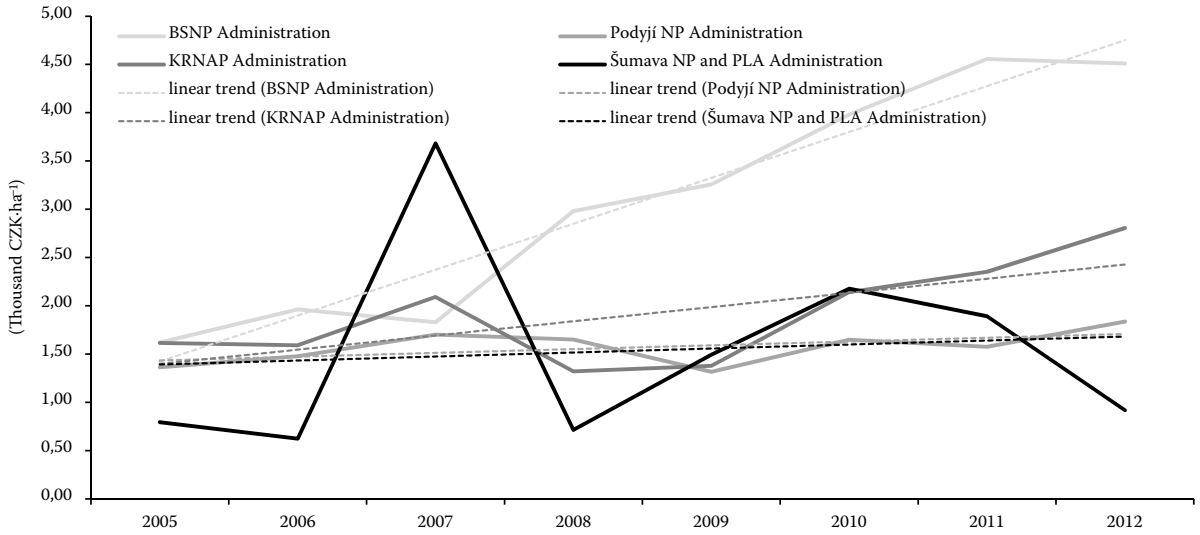

Fig. 3. The development of revenues from own activities (in thousand CZK) recalculated per hectare of the National Park (NP) area via a linear trend in the years 2005–2012 (Ministry of Finance of the Czech Republic 2014a,b)

BSNP – Bohemian Switzerland National Park, KRNAP – Krkonoše National Park, PLA – Protected Landscape Area

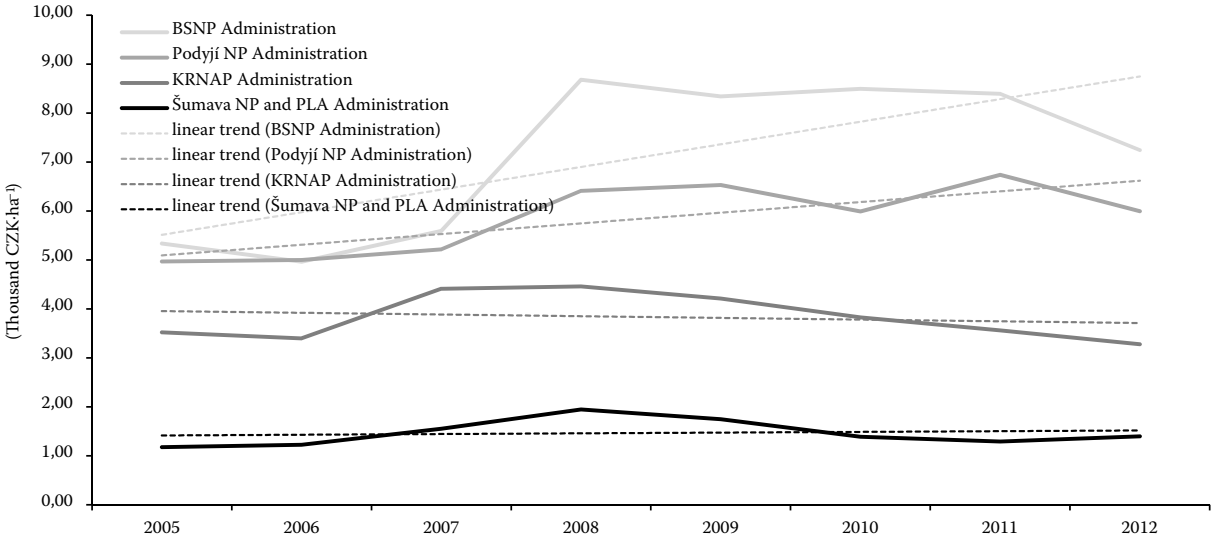

Fig. 4. The development of revenues from transfers (in thousand CZK) recalculated per hectare of the National Park (NP) area via a linear trend in the years 2005–2012 (Ministry of Finance of the Czech Republic 2014a,b)

BSNP – Bohemian Switzerland National Park, KRNAP – Krkonoše National Park, PLA – Protected Landscape Area

tional parks. It is not possible to predict whether the trend of operational grants will be decreasing or increasing in future years. The development of the linear trend is shown in Fig. 4.

During the analysed period the BSNP Administration had the highest revenues from transfers and highest allowances by the founder per hectare. For the other NP Administrations mainly allowances by the founder increased.

The analysis of revenues from transfers indicates that without such regular transfers from the state budget the analysed entities could not maintain their liquidity and thus could get into insolvency.

Through the application of the base index we ascertained the statements below.

On comparing 2005 with the other years (2006 to 2012), the greatest differences (i.e. either increase or decrease of an indicator in percentage terms) in personnel costs can be seen in the BSNP Administration – on average 16.17%. With the other NP Administrations these are not so significant on average (Podyjí NP Administration – 5%, KRNAP Administration – 6.17%, Šumava NP and PLA Administration – 14.33%).

The greatest differences in service costs on comparing 2005 with the other years (2006–2012) can be seen with Šumava NP and PLA Administration – on average 151.33%. With the other NP Administrations the average values are as follows: Podyjí NP Administration – 7.33%, KRNAP Administration – 37%, BSNP Administration – 148.83 %.

The greatest differences in revenues from own activities in 2005 compared with other years (2006 to 2012) can be seen for Šumava NP and PLA Administration – on average 149.33%.

With the other NP Administrations these amount on average to the following values: Podyjí NP Administration – 14.17%, KRNAP Administration – 36.5%, BSNP Administration – 98.83%.

The greatest differences in revenues from transfers in 2005 compared with other years (2006–2012) are found for the BSNP Administration – on average 53%. The average results with other NP Administrations are as follows: Podyjí NP Administration – 22.83%, KRNAP Administration – 16.83%, Šumava NP and PLA Administration – 28.17%.

By applying the chain index we ascertained the statements below:

The greatest differences – either increase or decrease of an indicator in percentage terms – in personnel costs between the individual years in the period 2005–2012 can be seen in the BSNP Administration – on average 28.33%. For the other NP Administrations there are no significant changes on average (Podyjí NP Administration – 5.67%, KRNAP Administration – 4.67%, Šumava NP and PLA Administration – 7%).

The greatest differences in service costs between the individual years in the period 2005–2012 can be seen for Šumava NP and PLA Administration – on average 225.5%. For all other NP Administrations these are on average as follows: Podyjí NP Administration – 15.67%, KRNAP Administration – 44%, BSNP Administration – 49.83%.

The greatest differences in revenues from own activities between the individual years in the period

2005–2012 are observed for Šumava NP and PLA Administration – on average 238.33%.

For all other NP Administrations these are on average as follows: Podyjí NP Administration – 22.67%, KRNAP Administration – 41.5%, the BSNP Administration – 49.83%.

The greatest differences in revenues from transfers between the individual years in the period 2005–2012 can be observed for the BSNP Administration – on average 23.83%. For all other NP Administrations the average results are: Podyjí NP Administration – 16.33%, KRNAP Administration – 12.5%, Šumava NP and PLA Administration – 16.67%.

DISCUSSION

Entry fees are the most common type of user fees in national parks. Such fees are not currently collected in the Czech Republic. Entry fees for special protection areas are not collected in the Czech Republic either. An exception could be charging for the use of the upper reaches of Vltava for watermanship in the Šumava NP and the entry of motor vehicles into a section of KRNAP NP (e.g. Hlaváčková, Kalousek 2011).

Here, the information collected from foreign literature regarding the importance of state budget for the financing of special protection areas is listed; it also includes a prediction of potential problems in the future should the reliance on only one funding mechanism (state budget) continue.

The most important source of funding of protected areas still seems to be the state budget (Baral et al. 2008).

The dependence on public budgets can be a problematic factor because the environmental sector often gets the lowest priority when the budget revenues decrease. Protected areas can generate revenues by collecting fees for entry into their recreational parts and parts used for tourism as well as by issuing various permits or licenses and collecting fees for environmental and other services, including the scientific research-related payments. These sources of income can reduce the dependence on public budgets and promote financial self-sufficiency of protected areas (Baral, Dhungana 2014).

Due to the insufficient funding and ever increasing costs of management of protected areas, it is very risky to rely solely on one financial mechanism (Hein et al. 2013).

The economics of protected areas is also discussed in, for example, Dudley et al. (2009). In the Czech Republic it is Hlaváčková (2011), Hlaváčková and Šafařík (2011) and Březina (2014).

The comparative analyses of economic indicators of the Czech national parks have been performed by Kupčáková (2010) for the period 2002–2006, Hlaváčková and Kalousek (2011) for the period 2005–2009, and Rejmanová (2012) for the period 2004–2010.

Every year, a large amount of money from the state budget is expended for the administration and maintenance of special protection areas in the Czech Republic. The authors listed performed comparative economic analyses of national parks in the Czech Republic with the goal of analysing the cash flows of national parks in general.

The amount of allowances and subsidies by the government for the running of national parks in individual years is listed in Table 1 and Fig. 4.

For the studied period the most balanced trend of significant economic indicators of the NP Administrations on comparing 2005 with the other years (2006–2012) was found out for Podyjí NP Administration (apart from revenues from transfers called operational grants), when KRNAP Administration shows the smallest change. The greatest differences (i.e. either increase or decrease of an indicator in percentage terms) can be seen on average with the BSNP Administration (in personnel costs, revenues from transfers) and Šumava NP and PLA Administration (service costs, revenues from own activities). For the studied period (2005–2012) the most balanced trend of significant economic indicators of the NP Administrations between the individual years is observed for Podyjí NP Administration. The greatest differences (i.e. either increase or decrease of an indicator in percentage terms) can be observed on average again in the BSNP Administration (in personnel costs, revenues from transfers) and Šumava NP and PLA Administration (service costs, revenues from own activities). The differences can be seen in Figs 1–4.

The highest personnel costs/area ratio is registered for Podyjí NP Administration – on average 2,826.05 CZK (106.48 EUR) per hectare over 8 years (Fig. 1). The highest per-hectare service costs (especially the forest production-related services) are observed for the BSNP Administration – on average 4,486.13 CZK (169.03 EUR) per year (Fig. 2). The highest per-hectare revenues from own activities (especially revenues from timber sales) are found out for the BSNP Administration – on average 3,087.43 CZK (116.33 EUR) over 8 years (Fig. 3). The highest operational grants/area ratio is registered in the BSNP Administration – on average 7,129.90 CZK (268.65 EUR) per hectare over 8 years (Fig. 4).

CONCLUSIONS

The article is beneficial for the area of economics and management of NP Administrations in the Czech Republic both from the scientific and practical point of view. No relevant literature on this topic exists in the Czech Republic.

The paper aims to analyse the development of major economic indicators of NP Administrations and provide their assessment for the reference period 2005–2012. All necessary data required for analysis was obtained from publicly available sources, primarily from Profit and Loss Statements of NP Administrations for the period 2005–2012. The selected economic indicators are personnel costs, costs of services, revenues from own activities, and revenues from transfers (allowance for activities). The applied methodology comprises time series modelling, correlation coefficient calculation and test of significance of the estimated correlation coefficient. Also simple indexes – base and chain ones – have been estimated. The obtained results did not allow to be compared with the results of other authors. All the findings about the future development of major economic indicators are based on theoretical calculations. There are many uncontrollable factors (e.g. political situation of the country, socio-economic perception of protected areas, EU strategies) which may cause an unexpected development of these indicators in the following years.

The results are applicable to the actual practice, especially by Ministry of the Environment of the Czech Republic. The potential for further research in this field can be found in the formulation of financial analysis methodology to assess the effectiveness of organisations providing public goods.

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