



Revenue of municipalities located in protected areas and their tourism potential

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Abstract

Motivation: Protected areas possess unique and prized natural, landscape, scientific, and socio-cultural resources and values. The natural conditions present in a given area are becoming an increasingly important factor in determining the development opportunities of individual territories. On the other hand, protected areas restrict economic activity and market opportunities. This can affect the well-being of local communities that live and work in these areas. Nevertheless, the majority of the available studies proves the positive impact of the operation of protected areas on the socio-economic development of local communities, income growth, and employment levels. The main factor in these positive effects is the possibility of a more intensive development of tourism and recreational services.

However, municipalities covered by protected areas do not constitute a uniform group of entities, representing considerable diversity in terms of development, which is measured by the revenue of budget of local units.

The identification of the various factors influencing the revenue levels of municipalities covered by protected areas is essential for development policy planning and formulating local strategies

Aim: The aim of the article is to assess the variation in revenue of different types of rural municipalities within protected areas, as well as to evaluate the relationship between the municipalities' own revenues earned and their tourism potential.

Results: Municipalities within protected areas develop in different ways. This article addresses the relatively rarely discussed issue of revenue differentiation among rural municipalities within protected areas and the relationship between revenue and their tourism potential.

Keywords: diversification of municipalities; protected areas, revenue of municipalities, tourism

JEL: O18; O44; R12; Z32

1. Introduction

The fundamental goals of establishing protected areas are to protect the environment, prevent the loss of biodiversity, and prevent climate change. However, in addition to direct environmental goals, protected areas can also be a factor in local development and contribute to poverty reduction.

The world literature contains the results of studies on the impact of protected areas' operation on the socio-economic development of land located within their borders and in their vicinity. Based on the analysis of selected case studies, the authors analyze the impact of protected areas on local communities. The studies cover tourist spending and their impact on business development and job creation (Braber et al., 2018; Rauf et al., 2020; Sang et al., 2018; Siltanen et al., 2023; Yergeau, 2020).

Other studies list the negative aspects of protected areas, related to the restriction of economic activities within them (D'Alberto et al., 2023; Rodríguez-Rodríguez & López, 2020). The authors also address the management of protected areas and the participation of the population, in this process (Anthony, 2007; Bennett & Dearden, 2014; Buono et al., 2012; White et al., 2002, Young et al., 2008).

This article proposes a slightly different approach to studying the effects of protected areas on local communities. It focuses on the study of the own revenue of municipalities the land of which is under environmental protection. The subject of the study are rural municipalities in Poland within national parks and landscape parks. These parks are a form of protection for large, cohesive areas with special natural and landscape values.

The main objective of the article is to assess the revenue differentiation of different types of rural municipalities within protected areas, as well as

to evaluate the relationship between the earned own revenue and the tourism potential of municipalities. The main objective was further clarified by formulating specific objectives, which include:

1. Assessment of the revenue level of rural municipalities within national parks and landscape parks, compared with other municipalities in Poland;
2. Assessment of revenue variation of different types of rural municipalities within protected areas;
3. Assessment of the relationship between the revenue of rural municipalities included in protected areas and their tourism potential.

Local fiscal outcomes are central not only to understanding the development effects and constraints associated with environmental protection, but also to analysing the incentive structures faced by local stakeholders. Municipal revenues can shape local acceptance, political support, and governance arrangements related to the designation and management of protected areas.

Moreover assessment of revenue variation of different types of rural municipalities, and the examination of tourism as a key transmission channel allow to highlight potentially informative development patterns.

The analysis focused on two types of protected areas: national parks and landscape parks, which play a central role in the system of protected areas. They hold a particularly important place due to their unique and prized natural, landscape, scientific, socio-cultural, and educational resources and values, as well as relatively large unit areas and importance for the socio-economic development of protected areas.

Research on the factors influencing the formation of rural municipalities' revenue in Poland is timely and important. Rural municipalities usually show a lower level of development than urban-rural or urban municipalities. Many significant development problems accumulate on their territory, and residents of rural municipalities tend to have fewer job opportunities and worse access to technology, infrastructure, and services. The occurrence of areas of natural value is a part of the character of rural municipalities and can be a potential for generating revenue for these units, and stimulate their development.

The study used descriptive statistics methods, the comparative analysis method, using the Kruskal-Wallis non-parametric test, and the correlation analysis method using Spearman's rank correlation coefficient. The statistical data used in the research came from the official source of verified statistical information, i.e. the Statistics Poland office, and from the Local Data Bank database. The research was conducted with reference to the state in 2023.

The next part of the article includes a literature review. The review is followed by a discussion of the research methodology used. Afterwards the authors present the results of the research, which include conclusions about the level of revenue of rural municipalities within national parks and

landscape parks in comparison with municipalities outside of these types of nature protection. The next part is an assessment of the revenue differentiation of different types of rural municipalities within protected areas. The presentation of the research results ends with the results of the analysis of the relationship between the revenue of the studied municipalities and their tourism potential. This is followed by a discussion of the obtained research results. The last part of the article contains conclusions.

2. Literature review

2.1. The socio-economic consequences of establishing protected areas

Protected areas have unique and prized natural, landscape, and socio-cultural resources and values. The natural conditions found in an area are becoming an increasingly important factor in determining the development capabilities of individual territories.

Establishing protected areas can have both positive and negative consequences due to the way these entities operate. Most studies prove the positive impact that protected areas can have, not only in terms of environmental sustainability, but also on the socio-economic development of communities and local economies, growth of employment and income of the population, and poverty reduction (Fan, 2022; Getzner, 2010; Kandel et al., 2022).

The impact of protected areas in various countries is most often viewed through the lens of economic effects related to tourism development and recreational activities (Bittlingmaier et al., 2021; Byström & Müller, 2014; Meyer et al., 2010; Zawilińska & Mika, 2015). Tourist spending supports a significant portion of economic activity (Meehan, 2014; Sang et al., 2018; Yergeau, 2020), giving impetus to the development of sectors such as accommodation, catering, retail and entertainment (Stynes, 2011). Owing to the benefits associated with tourism development, these areas have seen an increase in the number of jobs, which affects income and improves the quality of life (Alló et al., 2010; Bennett et al., 1996; Braber et al., 2018; Rauf et al., 2020; Saayman & Saayman, 2006; Siltanen et al., 2023), lowering poverty rates of the local community (Thomas et al., 2014), as well as the population living outside the protected area (Fredman & Yuan, 2011).

The negative effects of protected areas include, but are not limited to: a decrease in the income of the population and an increase in poverty caused by reduced access to the use of natural resources in protected areas (Moore et al., 2016; Withey et al., 2018) or economic losses caused by wild animals (Vedeld et al., 2012; Mojo et al., 2020).

Among the constraints are also those caused by regulations in protected areas. This is especially true for areas with a high regime of nature protec-

tion. From an ecological point of view, this guarantees the preservation of their natural resources and biodiversity, serves to protect or reduce the degradation of habitats and ecosystems, and increase the biomass and diversity of species. On the other hand, it determines the direction of economic activities and significantly limits their scope within the boundaries of protected areas (Kőszegi et al., 2022; Etxano, 2010; Jaros, 2015; Rodríguez-Rodríguez & López, 2020). Restrictions and prohibitions adversely affect opportunities for local businesses (D'Alberto et al., 2023). These constraints usually affect representatives of agriculture, forestry, timber industry, hunting associations or fisheries (Robertson et al., 2020). In addition, placing an area under legal protection and thus imposing restrictions on its use is a barrier to the development of construction (Etxano, 2010) and infrastructure or additional economic activities (D'Alberto, et al., 2020).

The literature also addresses the participation of local people in nature and landscape conservation planning, policy formulation and management of conservation areas (Anthony, 2007). The involvement of local communities in the management of protected areas has become widely recognized and seen as an indicator of sustainable practices (Buono et al., 2012).

2.2. System of protected areas in Poland

Poland's system of protected areas is defined in the Nature Conservation Act and consists of 10 forms of protection (Law on nature protection, 2004). Protected areas are distinguished by the abundance of environmental resources, their unique character, rules of operation and status. Each form has specific conservation objectives and designated functions. Protected areas include: national parks, nature reserves, landscape parks, areas of protected landscape, Natura 2000 areas, ecological areas, nature monuments, documentation sites and natural and landscape complexes, as well as species protection of plants, animals and fungi (Law on nature protection, 2004). In total, Poland's legally protected areas cover 32.3% (LDB, accessed 12.04.2025).

The largest acreage of protected area in Poland is occupied by Natura 2000 areas (27.1%). This is followed by areas of protected landscape with a share of 22.3% and landscape parks (8.3%) (Table 1). A particularly important place in the system of protected areas due to the highest protection requirements in force, is held by national parks and nature reserves. In 2023, national parks covered a total of 315,237.40 hectares, which was about 1% of the country's area and covered only 3.1% of all protected areas (LDB, accessed 12.04.2025).

National parks are areas with unique and prized natural, landscape, scientific, socio-cultural, and educational resources and values. They occupy areas of no less than 1,000 hectares, where all nature is protected (Law on nature protection, 2004).

National parks are of the greatest importance for the socio-economic development of protected areas due to their valuable natural environment, high protection regime, and relatively large unit areas. The purpose of their creation is to preserve and protect biodiversity, natural and cultural resources and values, to restore degraded or otherwise lost elements, and to make the area available to the population for educational and tourism purposes. The first park established in the world was Yellowstone National Park, in the United States, it was established in 1872. In Europe, the first country where this form of protection was introduced was Sweden. In 1909, a network of ten national parks was established on its territory.

There are 23 national parks in Poland. All of them are included in Natura 2000 areas designated at the European level for the protection of natural habitats, plant and animal species. They are the most valuable natural places in Poland. The oldest Polish national park is the Białowieża National Park, established in 1932.

Another form of nature protection is landscape parks. These areas are distinguished by their special natural, historical, cultural and landscape values. They are created to popularize these resources, assuming the principles of sustainable development, i.e. social and economic development that preserves the values and resources of the environment in a state that ensures both present and future generations the permanence of their use (Law on nature protection, 2004). With this form, the aim is to protect natural and landscape values from destruction and degradation. Landscape parks are treated as multifunctional areas, but above all they are attractive places for tourists due to their natural values and numerous tourist attractions. Thus, one of the most important functions they fulfill, in addition to nature and landscape protection, is the tourist function. It is characteristic of landscape parks to leave agricultural land, forest land and other properties in economic use. However, it should be noted that the use of these areas is limited to activities that ensure non-deterioration of the environment. The basic principle, however, is the possibility of sustainable use of the properties that are included in the acts establishing the parks. As of the end of 2023, 126 landscape parks with a total area of 2.6 million hectares had been established, covering 8.3% of the country's area.

National parks and landscape parks are located within the borders of 915 municipalities, respectively, and cover a total area of 315,000 hectares. Among the municipalities affiliated with the national parks, 236 have the status of an urban municipality, 230 have the status of an urban-rural municipality, while 449 have the status of a rural municipality.

3. Methods

In accordance with the specific objective (1), the first stage of the study assessed the level of revenue of rural municipalities within the areas of national parks and landscape parks, compared to other municipalities in Poland. To achieve this goal, a comparative analysis was conducted using statistical tests.

Selected types of municipal income were examined, i.e.:

- total own revenue per capita in PLN,
- revenue from shares in income taxes from individuals constituting revenue of the state budget per capita in PLN,
- revenue from shares in income taxes from legal entities constituting revenue of the state budget per capita in PLN,
- revenue from tax on business activity of individuals, paid in the form of tax card per capita in PLN,
- revenue derived from agricultural tax per capita in PLN,
- revenue derived from forestry tax per capita in PLN.

Municipalities' own revenue, including, in particular, revenue from taxes on individuals and legal entities, constituting municipalities' shares in taxes of the state budget, as well as revenue from tax on economic activity of individuals, carry important information on the economic condition of the municipality. These indicators are measures of the wealth of the residents of municipalities and the effects of economic activity, and also indirectly inform about the level of development of these territorial units. Revenues derived from agricultural tax carry information on the ability to use the potential of the countryside from agricultural activities, while revenues derived from forestry tax testify to the ability to use the natural potential of forest areas.

Three types of municipalities were analyzed for comparison:

- Rural municipalities within national parks,
- Rural municipalities within landscape parks,
- The rest of Poland's rural municipalities outside of park protection.

An assessment of the differentiation of municipalities in terms of the indicated types of revenue was carried out, comparing them in three groups of municipalities, separated according to the Delimitation of Rural Areas developed by Statistics Poland:

- Agglomeration rural municipalities – rural areas located within the functional areas of provincial cities and other cities with a population of at least 150 thousand,
- High-density non-agglomeration rural municipalities – municipalities located outside the boundaries of the functional areas of the above-mentioned cities, with a population density greater than 1/3 of the population density of Poland,

- Rural non-agglomeration low-density municipalities – municipalities located outside the boundaries of the functional areas of the above-mentioned cities, with a population density equal to or less than 1/3 of the population density of Poland.

Conducting surveys separately for each of the aforementioned groups is related to the fact that rural areas are not homogeneous units, but their specificity is related to their location, population density, and the performed economic function resulting from these characteristics. Comparing all municipalities together without taking into account these peculiarities could lead to results with insufficient precision.

For the same reason, in order to maintain the precision and comparability of the results, it was decided to select only rural municipalities for the analysis, excluding urban-rural and urban municipalities from the study, the incomes of which depend on factors different than those of rural municipalities. It should also be noted that the method of presentation of official data for urban-rural municipalities does not include a division of revenue into urban and rural parts.

The comparative analysis was performed using the methodology appropriate for the statistical procedure - one-way analysis of variance ANOVA. The purpose of this statistical method is to test the significance of differences between several means for samples from multiple populations. ANOVA makes it possible to determine whether the variation of distinguished functional groups in terms of the characteristics under study, has its origin in the variation between groups or in the variation within these groups. One-way analysis of variance ANOVA is a parametric test. Therefore, the variables under study must meet certain conditions, i.e. the condition of normality of the dependent variable distribution in each group and the condition of homogeneity of variance across groups.

The condition for normality of distribution of the variable in groups was tested with the Kolmogorov-Smirnov normality test. The homogeneity of variance was tested with Levene's test.

In the analyzed cases, the conditions of normality of the variable distribution and homogeneity of variance were not met, Therefore, in accordance with the rules of conduct in such cases, Fisher's classical statistics were replaced with a non-parametric test – the Kruskal-Wallis rank test, which corrects distribution distortions resulting from the occurrence of extreme results that could artificially increase or decrease the mean.

In the second stage of the research, in order to achieve specific objective (2), internal revenue differentiation in municipalities within national parks and landscape parks was assessed. It was assumed that park municipalities are not a homogeneous group of units. The search for criteria that differentiate them makes it possible to obtain information on the factors that affect the revenue they receive.

First, the differences between incomes in the covered municipalities, appearing according to their location and population density, were recognized. Thus, agglomeration municipalities, high-density non-agglomeration municipalities and low-density non-agglomeration municipalities were compared with each other.

Next, the variation among park municipalities was examined, taking into account the criterion of the share of park-covered area in the total area of municipalities. For the purposes of the study, three groups of municipalities were distinguished:

- Municipalities where the protected area covers less than 10% of the area,
- Municipalities where the share of the municipal area covered by a park is in the range [10%, 40%),
- Municipalities where the protected area covers more than 40% of the total area.

Kruskal-Wallis non-parametric tests were used in the research procedure.

In the third stage of the research, pursuing specific objective (3), the relationship between the revenue of rural municipalities within protected areas and their tourism potential was assessed.

The choice of features depicting the tourism potential of the surveyed municipalities was dictated by their substantive value, and the availability of data at the municipal level. These include:

- national economy entities registered in the REGON register in Section I per 10 thousand residents,
- natural persons running economic activities in Section I per 10,000 residents,
- legal persons and organizational entities without legal personality in Section I per 10 thousand residents,
- national economy entities registered in the REGON register in Section I Subsection 55 per 10 thousand residents,
- national economy entities registered in the REGON register in Section I Subsection 56 per 10 thousand residents,
- tourist function of the municipality – the number of tourist accommodations per 1,000 residents,
- accommodation density index – the number of beds per 100 km².

According to the Polish Classification of Activities, Section I classifies accommodation and food service activities, and thus includes enterprises operating in the broadly defined tourism industry. Section I identifies Subsection 55 – Accommodation, which includes the activities of hotels and other accommodation facilities, as well as Subsection 56 – Food and beverage service activities, which includes the activities of restaurants and other catering establishments.

In the course of the research process, the relationship between the own revenue of municipalities within national parks and landscape parks, and the mentioned characteristics was investigated. To examine the existence and strength of the relationship between these categories, correlation analysis was applied using Spearman's rank correlation coefficient, adequate for use in this study. This is because Spearman's rank correlation coefficient is used to measure the strength of the relationship between variables when the number of variants of measurable characteristics is small. In addition, it does not condition the normality of the distributions of these characteristics.

The relationship between the level of municipalities' own revenue and their tourism potential was studied for municipalities grouped by different location and population density (agglomeration and non-agglomeration), as well as for municipalities grouped by the criterion of the share of protected areas in their total area.

4. Results

4.1. Revenue level of rural municipalities, within national parks and landscape parks, compared to other rural municipalities in Poland

To achieve specific objective (1), concerning the assessment of the level of revenue of rural municipalities within protected areas, i.e. national parks and landscape parks, compared to other municipalities in Poland, a comparative analysis was carried out using the Kruskal-Wallis rank-sum test. The analysis was carried out separately for three groups of municipalities, i.e. agglomeration municipalities, high-density non-agglomeration municipalities and low-density non-agglomeration municipalities.

The results of the analysis show that no statistically significant differences can be found in any of the analyzed groups between municipalities within and not outside of protected areas in terms of own revenue and in terms of revenue derived from shares of corporate income taxes constituting state budget revenues (Table 2).

On the other hand, significant statistical differences were observed with regard to revenue derived from shares in personal income taxes constituting state budget revenues, but only in the group of high-density non-agglomeration municipalities (the Kruskal-Wallis test yielded: $\chi^2 = 16.892 \sim \chi^2(2)$; $p < 0.01$). In this group, the highest revenue from personal taxes was recorded in municipalities within landscape parks, slightly lower in municipalities within national parks, and the lowest in municipalities outside of protected areas.

In addition, high-density non-agglomeration municipalities show differences in terms of revenue derived from business activity of individuals, paid

in the form of tax card ($\chi^2 = 6.167 \sim \chi^2 (2)$; $p < 0.05$). The highest revenues were generated by municipalities within national parks, while the other two groups of municipalities generated lower revenues and showed no statistically significant differences between them. In terms of personal business tax, low-density non-agglomeration municipalities also differed significantly ($\chi^2 = 5.991 \sim \chi^2 (2)$; $p < 0.05$). Also in this group, the highest values were recorded in municipalities within national parks, and the values are significantly different from other groups of municipalities.

Non-agglomeration municipalities of high and low density are also varied in terms of revenue from forest tax (test results, respectively: $\chi^2 = 61.887 \sim \chi^2 (2)$; $p < 0.01$; $\chi^2 = 27.647 \sim \chi^2 (2)$; $p < 0.01$). In the case of high-density non-agglomeration municipalities, the highest forest tax revenues were earned by municipalities outside of protected areas, followed by municipalities with landscape parks and national parks. In contrast, in the case of low-density non-agglomeration municipalities, municipalities within national parks were at the top, followed by municipalities within landscape parks, and finally other municipalities.

It was further observed that the type of revenue that statistically significantly differentiates all the analyzed types of municipalities is agricultural tax revenue. In each group of municipalities, i.e. agglomeration ($\chi^2 = 9.487 \sim \chi^2 (2)$; $p < 0.01$), non-agglomeration high density ($\chi^2 = 41.868 \sim \chi^2 (2)$; $p < 0.01$) and low density ($\chi^2 = 26.368 \sim \chi^2 (2)$; $p < 0.01$), municipalities outside of protected areas are leading the way in this regard, differing significantly from park municipalities.

4.2. Assessment of internal variations within rural municipalities within protected areas

In line with the specific objective (2), the revenue differentials of different groups of rural municipalities within national parks and landscape parks were assessed.

As the first step, the differences between incomes in municipalities within protected areas were recognized. These differences appeared depending on location and population density. Thus, agglomeration municipalities, non-agglomeration high-density municipalities and non-agglomeration low-density municipalities were compared with each other (Table 3).

Location and population factors differentiate national park municipalities in terms of most types of revenue analyzed in a statistically significant manner. Agglomeration municipalities show own revenues to be statistically significantly higher ($\chi^2 = 9.108 \sim \chi^2 (2)$; $p < 0.05$) than non-agglomeration municipalities, and within these own revenues, also the revenue raised from personal taxes ($\chi^2 = 19.838 \sim \chi^2 (2)$; $p < 0.01$). Statistically significant differences exist also between national park municipalities in agricultural

tax revenues ($\chi^2 = 26.5 \sim \chi^2(2)$; $p < 0.01$) and forestry tax revenues ($\chi^2 = 40.525 \sim \chi^2(2)$; $p < 0.01$). The highest revenues from these two types of taxes were received by low-density non-agglomeration municipalities.

Similar findings apply to municipalities within landscape parks. Also in their case, the revenue of agglomeration municipalities is higher by a statistically significant value than that of non-agglomeration municipalities in terms of total own revenue ($\chi^2 = 9.898 \sim \chi^2(2)$; $p < 0.01$), revenue coming from income taxes from natural persons ($\chi^2 = 92.295 \sim \chi^2(2)$; $p < 0.01$), revenue derived from income taxes from legal persons ($\chi^2 = 12.102 \sim \chi^2(2)$; $p < 0.01$), and revenue derived from tax on economic activity of natural persons paid by tax card ($\chi^2 = 19.071 \sim \chi^2(2)$; $p < 0.01$). Non-agricultural low-density municipalities led the way in terms of revenue derived from agricultural tax ($\chi^2 = 45.101 \sim \chi^2(2)$; $p < 0.01$) and from forest tax ($\chi^2 = 147.754 \sim \chi^2(2)$; $p < 0.01$).

However, it should be noted that the important issue is the spatial distribution of protected areas. Differences observed across groups may partly reflect regional patterns rather than effects related to protected status. (tab. 4). In particular agglomeration municipalities within protected areas are geographically concentrated in a limited number of regions, mainly in the most developed regions: Mazowieckie, Małopolskie and Śląskie.

Interesting results were provided by the study of variations between different groups of park municipalities, formed according to the criterion of the share of park-covered area in the total area of municipalities (Table 5).

There are no statistically significant differences between municipalities with different acreage of protected areas in terms of most of the types of revenue analyzed, i.e. total own revenue, revenue derived from shares of taxes constituting state budget revenue, and revenue derived from personal business tax.

For both national park and landscape park municipalities, statistically significant differences existed only with regard to revenue derived from agricultural taxes (test result, respectively: $\chi^2 = 7.339 \sim \chi^2(2)$; $p < 0.05$; $\chi^2 = 15.337 \sim \chi^2(2)$; $p < 0.01$). Municipalities with the smallest acreage (up to 10% of the area) had the highest revenues. These municipalities differed significantly from the other two groups, for which no statistically significant differences were found.

In addition, there were statistically significant differences for municipalities within landscape parks in terms of revenue derived from forest tax ($\chi^2 = 13.268 \sim \chi^2(2)$; $p < 0.01$). Higher revenues from this source were drawn by municipalities where the protected areas cover more than 40% of the total area, while no differences were found between the other groups.

4.3. Assessing the relationship between the revenue of rural municipalities within protected areas and their tourism potential

An interesting aspect in the search for factors related to the level of revenue of municipalities within national and landscape parks, is the study of their relationship with indicators depicting the tourism potential of municipalities, which is another specific objective (3) of the article. These relationships were studied for municipalities grouped by different location and population density (Table 6) and municipalities grouped by the criterion of the share of protected areas in their total area (Table 7).

Among the units within national parks, own revenues of non-agglomeration municipalities show stronger relationships with the characteristics depicting tourism potential than own revenues of agglomeration municipalities. In non-agglomeration municipalities, all values of the correlation coefficient between own revenues and the selected characteristics related to their tourism potential reached high positive values indicating a strong correlation of the studied characteristics. The results of the correlation analysis were statistically significant at the level of 0.01. In non-agglomeration municipalities, the strongest relationship was recorded between the level of own revenues and the number of entities registered in the REGON register in Section I, which includes accommodation and food service activities (the value of the correlation coefficient was 0.64 for low-density municipalities and 0.58 for high-density municipalities), with a stronger relationship recorded for Subsection 56, concerning food and beverage service activities (correlation coefficient at 0.62 for these two groups of municipalities) and a slightly weaker one for Subsection 55, covering accommodation activities (0.58 for low-density municipalities and 0.50 for high-density municipalities). The level of own revenue correlates strongly with the tourist function of these municipalities, as measured by the number of tourist accommodation places per 1,000 residents (0.60 for low-density municipalities and 0.63 for high-density municipalities), as well as with the accommodation density index, measured by the number of beds per 100 km² (0.59 and 0.58, respectively).

Agglomeration municipalities seem to link their revenues less closely to the use of tourism potential. Although their own revenues correlate strongly with the number of entities operating in Section I (0.60), this is mainly due to strong links with catering activities, described in Subsection 56 of that section (0.55). In contrast, own revenues show a very weak relationship with accommodation activities, described in Subsection 55 (0.25). They also have no relationship with the tourist function of these municipalities, nor with the density of the tourist base.

The revenue of municipalities within landscape parks show weaker relationships with their tourism potential. Conversely to national park muni-

palities, the strongest relationships between the studied aspects are found in agglomeration municipalities. The own revenues of these municipalities are strongly correlated with the number of business entities engaged in Section I activities (0.54), especially with the number of individuals engaged in these activities (0.55). At the same time, municipalities' own revenues are more strongly correlated with the number of entities operating in Subsection 56 (0.54) than with the number of entities operating in Subsection 55 (0.41).

For non-agglomeration municipalities, there is a moderate correlation between their own revenues and the number of businesses operating in Section I (0.43 for low-density municipalities and 0.33 for high-density municipalities). In low-density municipalities, a moderate correlation is found for both entities operating in Subsection 55 (0.40) and in Subsection 56 (0.38). In high-density municipalities, on the other hand, own revenues are very weakly correlated with economic activity in Subsection 55 (0.20) and moderately with activity in Subsection 56 (0.34).

At the same time, in none of the groups of landscape park municipalities do their own revenues show a relationship with the tourist function of these municipalities, nor with the density of the tourist base.

The possibilities of using tourism potential to generate revenue for rural municipalities vary in different groups of municipalities, these groups being based on the share of protected areas in their total area. In the case of national park municipalities, only those with a protected area between 10% and 40% show a correlation between their own revenues and indicators characterizing their tourism potential. There is a strong correlation between the revenues of these municipalities and the number of business entities in Section I (0.60), including both those operating in Subsection 55 of this section (0.50) and in Subsection 56 (0.51). There is also a strong correlation of revenue with the tourist function a (0.57) and a moderate correlation with the density of the tourist base (0.43).

For landscape park municipalities, only in the group of municipalities where the area of parks is less than 10% of the total area, there was a strong correlation between own revenues and the number of entities operating in Section I (0.54), with a strong correlation between revenue and the number of entities registered in Subsection 56 (0.54), while a moderate correlation applies to the relationship with entities operating in Subsection 55 (0.34). Municipalities with a protected area between 10% and 40% have a moderate correlation between their own revenues and the indicators characterizing their tourism potential, and for municipalities where landscape parks cover the area the most (more than 40% of the area), the correlations are weak.

5. Discussion

The conclusions of the study on the evaluation of the level of revenues of rural municipalities within national parks and landscape parks, compared with other municipalities in Poland, indicate that in terms of total own revenues per capita, park municipalities do not differ from other rural municipalities in Poland, not covered by this type of protection. However, certain differences become apparent in terms of selected types of revenue, which constitute own revenues.

Within the group of non-agglomeration municipalities, national park municipalities receive the highest revenue derived from tax on economic activity of natural persons, paid in the form of tax card, and higher revenue from income taxes from natural persons, than non-park municipalities. On the other hand, municipalities associated with national parks receive the lowest revenue derived from agricultural tax. It can be thought that the existence of a national park is conducive to small business, such as the tourism industry. This revenue compensates for the lower revenue from limited agricultural activities, which is due to legal restrictions on land use within national parks. On the other hand, however, lower agricultural revenues does not necessarily have to be a consequence of protection-induced restrictions. Protected areas may have been designated in locations with lower agricultural potential, in areas where agricultural activities were already declining.

In the group of non-agglomeration municipalities, the landscape park municipalities are also characterized by higher revenue among the population than non-park municipalities, as evidenced by their raising the highest revenues from taxes on natural persons. On the other hand, they do not differ from municipalities outside of protected areas in terms of revenue from taxes on small businesses run by natural persons, and are even inferior to them in terms of revenue derived from agricultural and forestry taxes.

A specific group is formed by agglomeration rural municipalities. Their incomes are not differentiated by the existence or absence of protected areas. These units form a group of highly urbanized municipalities, which associate their development and generated revenue with a large city with which they have functional ties. Other ongoing studies lead to similar conclusions, which prove that the highest level of development among rural municipalities is demonstrated by urbanized municipalities. They are characterized by a higher population density, as well as a greater number of economic entities. These areas are more attractive for living and starting a business (Kudełko, 2019).

However, it should be noted that spillover effects to neighbouring municipalities are not addressed in the analysis. Municipalities adjacent to protect-

ed areas are treated as non-protected units, although they may benefit from positive externalities associated with tourism or environmental amenities.

Conclusions from studies aimed at assessing internal revenue variations within municipalities within national parks and landscape parks, confirm the regularities described above. The location factor is crucial in explaining variations among municipalities covered by legal protection. Both in the case of municipalities within national parks and landscape parks, agglomeration municipalities have significantly higher own revenues than non-agglomeration municipalities, including revenues from taxes on natural persons, legal persons and taxes on economic activity of natural persons. In contrast, low-density non-agglomeration municipalities have the highest revenues derived from agricultural tax and forestry tax.

At the same time, it was found that the share of protected area in the total area of municipalities generally does not affect the amount of revenue these entities earn. The percentage of protected area, however, is significant with regard to revenue derived from agricultural tax. Municipalities with the smallest percentage of protected area (up to 10% of the area) derive the highest revenue from agricultural tax, which is related to the limited opportunities for agricultural activity on the territories of municipalities with a higher percentage of protected areas. In the case of landscape parks, with regard to revenue derived from the forest tax, significantly higher revenue was earned by municipalities in which the protected area covers more than 40% of the total area. This is probably related to the greater afforestation of park areas.

A study of the relationship between the value of municipalities' own revenue and indicators related to tourism activities, shows that national park municipalities have more opportunities to use their tourism potential to generate their revenue, and in this way also stimulate development, than landscape park municipalities. This is especially true for non-agglomeration municipalities, where the share of park-covered area is between 10% and 40%. Such municipalities combine the benefits of proximity to a national park and the associated landscape and environmental attractions, while at the same time they can conduct economic activities on the greater part of their territory, unrestricted by legal prohibitions (in contrast to municipalities where the greater part of the territory is covered by protection and at the same time prohibitions on economic activity).

These conclusions are in line with the findings of other authors, who demonstrate that tourism activity and related revenues are one of the of the key benefits for entities operating in protected areas. Tourists' expenditures support the development of economic activity (Meehan, 2014; Sang et al., 2018; Yergeau, 2020), mainly in industries related to accommodation, food services and entertainment. This increases employment in protected areas, which in turn generates income growth for the local population (Bennett et al., 1996; Siltanen et al., 2023; Braber et al., 2018). The benefits associated

with tourism development offset the opportunity costs of reduced agricultural production or natural resource extraction (Sims, 2010).

In agglomeration municipalities the revenue is less related to the use of tourism potential. No relationship has been shown between the value of own revenues and the tourist function of these municipalities, as measured by the number of tourist accommodations per 1,000 residents, or the density of the tourist base, defined as the ratio of accommodations to the area of the municipality. Own revenues in agglomeration municipalities show a stronger correlation with their restaurant and catering businesses than with those associated with hotel and other lodging establishments. These results are likely influenced by the fact that agglomeration municipalities, as specific, highly urbanized units, clustered around larger cities and functionally connected to them, have access to other, non-tourist sources of revenue that non-agglomeration municipalities lack.

The revenues of municipalities within landscape parks show weaker links to their tourism potential than those of municipalities within national parks. This is probably related to their less attractive environmental and landscape qualities. Similarly, as in the case of units associated with national parks, own revenues show no relationship with the tourist function of these municipalities, nor with the density of the tourist base. Conversely to the case of national park municipalities, stronger relationships between the studied aspects are found in agglomeration municipalities than in non-agglomeration municipalities. The strongest relationship between own revenues and indicators describing tourism potential was identified in the group of municipalities where less than 10% of the area is covered by parks.

The obtained results should be approached with some caution. A correlation study does not indicate causality of some phenomena in relation to others, but only reveals their co-occurrence. In addition, significant limitations in the availability of official, verified statistical data available at the level of municipalities (e.g., on the number of tourists and the use of accommodations) prevent a more precise study of the importance of tourism activities for the revenues generated by the municipalities. In addition, the method of obtaining officially released data relating to the number of accommodation places is often based on estimates, which can limit the precision of the information provided. It's worth mentioning that when assessing the tourism function, only those facilities operated as part of a business are considered. Agritourism farms are not always run this way.

Moreover, protected areas are not randomly assigned in space, but they are established in locations with pre-existing touristic and environmental characteristics. Consequently, It is difficult to say for certain therefore whether protected areas foster tourism-related activities and revenues, or whether they are preferentially designated in already attractive territories.

6. Conclusion

The study made it possible to assess the level of own revenues of rural municipalities within national parks and landscape parks; to determine the revenue differentiation of different types of rural municipalities within protected areas, and to identify the relationship between earned own revenues and the tourism potential of municipalities.

The level of total own revenue of rural municipalities within national parks and landscape parks does not differ from other rural municipalities in Poland that do not have this type of protection. However, the structure of own revenue reveals the peculiarities of park municipalities. Residents of national park municipalities show a higher level of entrepreneurship, especially with regard to the business activities of individuals. Tax revenues generated by this activity compensate for lower revenues from limited agricultural activities.

The specificity of rural agglomeration municipalities, which are functionally linked to large cities, mean that their revenues are not differentiated by the existence or absence of protected areas. At the same time, agglomeration municipalities link their revenues to the use of tourism potential to a lesser degree.

Similarly, the share of protected areas in the total area of a municipality does not affect the amount of total revenue it earns. However, the larger the protected area, the more difficult it is to carry out agricultural activities, and on the other hand, there are greater opportunities to draw revenue from forest tax.

National park municipalities have more opportunities to use tourism potential to generate their revenues than landscape park municipalities. This is especially true for non-agglomeration municipalities.

The authors are aware of some shortcomings of the research conducted. These are mainly caused by a significant limitation in access to verified statistical data available at the level of municipalities. However, the topic seems timely and important, and the conclusions of the research open the way for further in-depth analysis. Future research directions could be supplemented by an analysis of the dynamics of changes in revenues of rural areas covered by park protection over a longer period of time. The next area of future research could be a broadened analysis, including other factors affecting the revenue structure and the development of park municipalities. Future research directions could also include other, non-financial aspects related to the development of protected areas, taking into account their specificity and uniqueness.

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Appendix

Data availability: The dataset supporting the findings of this study is available in the ROD-BUK repository at <https://doi.org/10.58116/UEK/PF4LS7>

Table 1. Objects of special natural values legally protected in Poland (as of 2023)

Specification	Number	Total area in ha	% of country's area
National parks	23	315 237.40	1.0
Nature reserves	1523	172 987.74	0.6
Landscape parks	126	2 615 717.43	8.3
Protected landscape areas	389	7 014 193.90	22.3
Natura 2000 areas	1013	8507779.4	27.1
Documentation site	186	928.97	0.0
Ecological area	8217	56 739.55	0.2
Natural and landscape complexes	319	117 291.25	0.4

Source: Local Data Bank, Statistics Poland, www.stat.gov.pl

Table 2. Average values of selected types of revenue of rural municipalities covered by national parks and landscape parks, and of other rural municipalities in Poland in 2023.

Specification	agglomeration municipalities			high-density non-agglomeration municipalities			low-density non-agglomeration municipalities		
	municipalities within national parks	municipalities within landscape parks	municipalities outside of national parks or landscape parks	municipalities within national parks	municipalities within landscape parks	municipalities outside of national parks or landscape parks	municipalities within national parks	municipalities within landscape parks	municipalities outside of national parks or landscape parks
Number of municipalities	18	76	185	23	175	531	34	123	335
Total own revenue per capita in PLN	3465.14	2855.66	3040.75	2274.04	2570.65	2700.58	3077.38	2612.74	2516.08
Revenue from shares in income taxes from natural persons constituting income of the state budget per capita in PLN	1206.04	925.47	905.54	531.84	678.43	650.92	514.66	533.94	517.72
Revenue from shares in income taxes from legal persons constituting income of the state budget per capita in PLN	129.61	51.49	61.90	19.15	39.09	43.59	23.42	29.17	22.85
Revenue from tax on economic activity of natural persons, paid in the form of tax card per capita in PLN	3.78	2.54	2.74	6.34	2.15	2.15	4.76	2.27	1.35
Revenue from agricultural tax per capita in PLN	66.20	84.90	104.14	35.44	98.66	130.04	132.93	162.69	229.57
Revenue from forestry tax per capita in PLN	15.32	24.53	18.48	25.63	25.85	16.58	184.37	90.75	64.57

Shaded boxes indicate the presence of statistically significant differences between the highlighted municipalities

Source: own calculations based on statistics made available in the Bank of Local Data, Statistics Poland.

Table 3. Average values of selected types of revenue of rural municipalities of different locations within national parks and landscape parks in 2023.

Specification	municipalities within national parks			municipalities within landscape parks		
	agglomeration municipalities	high-density non-agglomeration municipalities	low-density non-agglomeration municipalities	agglomeration municipalities	high-density non-agglomeration municipalities	low-density non-agglomeration municipalities
Number of municipalities	18	23	34	76	175	123
Total own revenue per capita in PLN	3465.14	2274.04	3077.38	2855.66	2570.65	2612.74
Revenue from shares in income taxes from natural persons constituting income of the state budget per capita in PLN	1206.04	531.84	514.66	925.47	678.43	533.94
Revenue from shares in income taxes from legal persons constituting income of the state budget per capita in PLN	129.61	19.15	23.42	51.49	39.09	29.17
Revenue from tax on economic activity of natural persons, paid in the form of tax card per capita in PLN	3.78	6.34	4.76	2.54	2.15	2.27
Revenue from agricultural tax per capita in PLN	66.20	35.44	132.93	84.90	98.66	162.69
Revenue from forestry tax per capita in PLN	15.32	25.63	184.37	24.53	25.85	90.75

Shaded boxes indicate the presence of statistically significant differences between the highlighted municipalities

Source: own calculations based on statistics made available in the Bank of Local Data, Statistics Poland.

Table 4. Average values of selected types of revenue of rural municipalities with different areas covered by national parks and scenic parks in 2023

Region	municipalities within national parks			municipalities within landscape parks		
	agglomeration municipalities	high-density non-agglomeration municipalities	low-density non-agglomeration municipalities	agglomeration municipalities	high-density non-agglomeration municipalities	low-density non-agglomeration municipalities
Dolnośląskie	0	1	1	2	23	3
Kujawsko-pomorskie	0	0	0	4	11	15
Lubelskie	0	2	6	8	19	22
Lubuskie	0	0	2	1	1	10
Łódzkie	0	1	0	3	15	8
Małopolskie	3	15	1	8	13	0
Mazowieckie	6	0	1	11	7	13
Opolskie	0	0	0	6	2	2
Podkarpackie	0	3	4	2	15	8
Podlaskie	3	0	14	2	2	6
Pomorskie	0	1	4	2	12	10
Śląskie	0	0	0	16	28	2
Świętokrzyskie	4	0	0	7	9	4
Warmińsko-mazurskie	0	0	0	0	3	12
Wielkopolskie	2	0	0	2	15	5
Zachodniopomorskie	0	0	1	2	0	3
Total	18	23	34	76	175	123

Source: own calculations based on statistics made available in the Bank of Local Data, CSO.

Table 5. Average values of selected types of revenue of rural municipalities with different areas covered by national parks and scenic parks in 2023

Specification	municipalities covered by national parks			municipalities covered by landscape parks		
	share of municipal area covered by park < 10%	share of the municipality's area covered by the park [10%, 40%)	Share of municipal area covered by park > 40%	share of municipal area covered by park < 10%	share of the municipality's area covered by the park [10%, 40%)	Share of municipal area covered by park > 40%
Number of municipalities	35	28	12	99	160	115
Total own revenue per capita in PLN	2560.0	3202.2	3337.2	2641.4	2624.7	2667.9
Revenue from shares in income taxes from natural persons constituting income of the state budget per capita in PLN	609.9	674.0	935.2	687.8	676.3	682.0
Revenue from shares in income taxes from legal persons constituting income of the state budget per capita in PLN	23.5	43.1	128.4	41.1	37.1	37.7
Revenue from tax on economic activity of natural persons, paid in the form of tax card per capita in PLN	2.7	6.0	9.4	2.1	2.6	2.0
Revenue from agricultural tax per capita in PLN	118.2	65.7	45.7	142.1	116.1	96.4
Revenue from forestry tax per capita in PLN	60.3	117.3	145.0	39.3	41.5	61.1

Shaded boxes indicate the presence of statistically significant differences between the highlighted municipalities

Source: own calculations based on statistics made available in the Bank of Local Data, CSO.

Table 6. Correlation between own revenue per capita of rural municipalities with different locations and selected characteristics in 2023

Selected features	The value of Spearman's correlation coefficient between own revenue per capita and selected characteristics						
	municipalities within national parks			municipalities within landscape parks			
	agglomeration municipalities	high-density non-agglomeration municipalities	low-density agglomeration municipalities	agglomeration municipalities	high-density non-agglomeration municipalities	low-density agglomeration municipalities	
National economy entities registered in the REGON register in Section I per 10 thousand residents.	0.60	0.58	0.64	0.54	0.33	0.43	
Natural persons doing business in Section I per 10,000 residents.	0.51	0.58	0.54	0.55	0.27	0.39	
Legal persons and non-corporate organizational entities in Section I per 10 thousand residents.	0.53	0.60	0.55	0.49	0.38	0.37	
Entities of national economy registered in the REGON register in Section I in Subsection 55 per 10 thousand residents.	0.25	0.50	0.58	0.41	0.20	0.40	
Entities of national economy registered in the REGON register in Section I in Subsection 56 per 10 thousand residents.	0.55	0.62	0.62	0.54	0.34	0.38	
Tourist function of the municipality - number of tourist accommodation places per 1,000 residents.	0.01	0.63	0.60	0.15	0.11	0.28	
Accommodation density index - number of beds per 100 km ²	0.07	0.58	0.59	0.20	0.10	0.27	

Shaded boxes indicate the presence of a correlation significant at the 0.01 level

Source: own calculations based on statistics made available in the Bank of Local Data, CSO.

Table 7. Correlation between own revenue per capita of rural municipalities with different protected areas and selected characteristics in 2023

Selected features	The value of Spearman's correlation coefficient between own revenue per capita and selected characteristics					
	municipalities within national parks			municipalities within landscape parks		
	share of municipal area covered by park < 10%	share of the municipality's area covered by the park [10% , 40%)	Share of municipal area covered by park > 40%	share of municipal area covered by park < 10%	share of the municipality's area covered by the park [10% , 40%)	Share of municipal area covered by park > 40%
National economy entities registered in the REGON register in Section I per 10 thousand residents.	0.28	0.60	0.10	0.54	0.44	0.28
Natural persons doing business in Section I per 10,000 residents.	0.28	0.46	0.10	0.49	0.39	0.23
Legal entities and non-corporate organizational entities in Section I per 10 thousand residents.	0.31	0.50	0.28	0.46	0.37	0.44
Entities of national economy registered in the REGON register in Section I, Subsection 55 per 10 thousand residents.	0.14	0.50	-0.06	0.34	0.28	0.31
Entities of national economy registered in the REGON register in Section I, Subsection 56 per 10 thousand residents.	0.34	0.51	0.46	0.54	0.42	0.29
Tourist function of the municipality - number of tourist accommodations per 1,000 residents.	0.29	0.57	-0.24	0.10	0.15	0.20
Accommodation density index - number of beds per 100 km ²	0.28	0.43	-0.08	0.11	0.17	0.21

Shaded boxes indicate the presence of a correlation significant at the 0.01 level

Source: own calculations based on statistics made available in the Bank of Local Data, CSO.