

Załącznik 4

Summary of professional achievements

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- 1. First name and surname: Adam, Zbigniew Zydrón**
- 2. Diplomas, scientific degrees and employment history**

27.06.1997 – received the degree of Master Engineer in the field of study Forestry at the Faculty of Forestry, the August Cieszkowski Agricultural University of Poznań

20.06.2006 – received the PhD degree in forestry sciences in the discipline of forestry economics at the Faculty of Forestry, the August Cieszkowski Agricultural University of Poznań. Doctoral dissertation entitled „*Problems of valuation of forest land property following the transformation of the political and economic system in Poland*”, Scientific supervisor dr hab. Antoni Buraczewski, prof. nadzw. Reviewers: prof. dr hab. inż. Mieczysław Podgórski, the August Cieszkowski Agricultural University of Poznań, dr hab. Andrzej Nowak prof. nadzw. The University of Warmia and Mazury in Olsztyn.

12.11.1999 – completed 2-semester Post-graduate Studies in real estate appraisal. The Faculty of Geodesy and Land Management, the University of Warmia and Mazury in Olsztyn.

22.11.2008 – completed 2-semester Post-graduate Studies in urban planning and spatial planning. The Faculty of Architecture. The Wrocław University of Technology

14.11.2012 – Certificate of Imagis S.A. – workshops in Encom Discover 3D software.

06.03.2015 – Certificate of Authoryzowane Centrum Szkoleniowe Esri Polska – completed a course in „ArcGis 2: Efficient application of GIS tools”.

29.04.2015 – Certificate of Authoryzowane Centrum Szkoleniowe Esri Polska – completed a course in „Creation and surface analysis in ArcGIS Spatial Analyst.

2. Information on employment history in scientific units:

1997-2004 – asystent [assistant lecturer] at the Department of Land Reclamation, Environmental Management and Geodesy, the August Cieszkowski Agricultural University of Poznań,

2004-2006 – asystent [assistant lecturer] at the Department of Land Reclamation, Environmental Management and Geodesy, the Faculty of Land Reclamation and Environmental Engineering, the August Cieszkowski Agricultural University of Poznań,

2006 – to the present - adiunkt [Assistant Professor] at the Institute of Land Reclamation, Environmental Management and Geodesy, Sub-department of Spatial Management and Geodesy, Faculty of Environmental Engineering and Spatial Management, Poznań University of Life Sciences.

3. Scientific accomplishment constituting the basis for the application for the post-doctoral degree [doktor habilitowany]**a) title of scientific accomplishment:****b)**

„ENVIRONMENTAL VALUE AND PUBLIC WILLINGNESS TO PAY FOR THIS GOOD”

c) Publications constituting the basis for the application for the post-doctoral degree [doktor habilitowany]:

- 1. Zydrón A; Kayzer D.** 2015. *Podnoszenie świadomości społeczeństwa o nowych metodach wyceny wartości przyrody –Willingness to Pay oraz Willingness to Accept na przykładzie Wielkopolskiego Parku Narodowego* [Increasing public awareness of novel nature value valuation methods – Willingness to Pay and Willingness to Accept – based on the Wielkopolska National Park] (25 points). Monograph ISBN 978-83-7986-078-4.
- 2. Zydrón A; Szoszkiewicz K.** 2013. *Wartość środowiska a gotowość społeczeństwa do zapłacenia za to dobro* [Environmental value and public willingness to pay for this good]. *Annual Set The Environment Protection*. Vol. 15: 2874-2886. (15 points, $if_{2013}=0.806$).
- 3. Zydrón A; Kayzer D; Szoszkiewicz K.** 2014. *Czynniki różnicujące wysokość rekompensaty w przypadku uniemożliwienia korzystania z Wielkopolskiego Parku Narodowego* [Factors differentiating the level of compensation for refusal to use the Wielkopolska National Park]. *Barometr Regionalny*, vol. 12 no. 4: 165-170. (8 points).

Results of research presented in the above-mentioned publications were gathered within the framework of the research project entitled “Environmental value and public willingness to pay for this good” no. UMO – 2011/03/B/HS4/06031 (6/2012/OPUS), of which I was the head.

2. Discussion of the scientific aim and gathered results of this research

Introduction

Management of a natural resource, such as a national park, requires continuous access to information on the economic value of these resources. However, non-market attributes and value of a natural resource are frequently an obstacle in a reliable assessment of this value. In such a case the economic value may be measured directly and it may be referred to the willingness to pay for environmental protection, expressed by individual people. Choice made by consumers depends not only on their financial resources, but also on the willingness to pay for the opportunity to use the environment. When making decisions on the method to use financial resources an important role is also played by the opinion of the consumer. When discussing the subjective attitude of individuals to goods, economists use the term “preference” and referring to consumer preferences we may indicate which goods are considered most desirable for them. Several decades ago economics had no tools to value non-market goods. Only in the second half of the 20th century methods were developed, using which also this sector of the economy may be associated with monetary value (Żylicz 2012).

Elements of the natural environment, i.e. the air, waters, forests or unique landscapes, have their own value. Their non-tangible, non-material value is obvious. However, in many cases the value of priceless resources may be determined using market measures, i.e. prices (Folmer H., Gabel, Opschoor H 1996).

The problem of forest appraisal results from the general premises and processes found in the modern economy. The objective is to establish foundations for the valuation of natural resources in order to improve their condition, protection and rational use (Partyka, Parzuchowska 1993).

The need to provide accounting methods for costing of tree stands, forest land and other forest land property appeared in Poland as later as the 1990’s following the political and economic transformation. As a result of the development of the real estate market connected with sale and purchase of such property as well as the focus on non-productive functions of forests and protected areas we are observing increasing demand for studies analysing principles, methods and procedures of valuation for various types of forest property (Podgórski, Zydróż 2001).

Apart from the production (raw material base) function forests also serve multiple non-production (non-material) functions: protective, recreational and health-promoting functions. In Poland these functions are not market goods, since public (state and commune) forests, covering 81.51% total forested area practically have not been subjected to commercial (market) turnover (Zajęc 2013).

In human life forests serve numerous important functions, which value may be easily converted to money. Forest economy provides us with raw materials, which may be used to

build or heat houses, manufacture furniture, paper and many other consumables. However, we need to realise that apart from wood forests provide us with non-material values, which are not subject to market turnover.

Non-production functions of forests were first indicated during the industrial revolution in the 19th century, introducing remarks on the social, ecological and protective value of forests in legal documents. In Poland the first document discussing public functions of forests was a Russian Act of 1888, which concerned forests of the Congress Kingdom of Poland and which entered into force in 1898 (Klocek 1999). Already at that time forests were appreciated and protected as common good; however, its potential monetary value for the society was not taken into consideration.

It is assumed that environmental resources are priceless; however, due to their finite amounts the public needs to become aware of their tremendous role in the functioning of the economy and of their effect on the overall quality of human life. The best method to present these dependencies in the most convincing way is to give environmental resources their monetary value. The aim of this process is not only to increase public awareness, but also to estimate the value people attribute to the environment and other public goods, which are not subjected to market appraisal. Determination of the monetary value promotes the development of the green attitude, facilitates management of expenditure on environmental protection e.g. by determining the potential impact of investments on its individual elements perceived from the human point of view.

However, it should be remembered that appropriate valuation requires considerable knowledge and that there are significant obstacles resulting mainly from the public opinion that money may not comprehensively reflect the full value of environmental goods. Nevertheless, it needs to be remembered that this type of valuation is continuously being developed and novel, improved methods and techniques of valuation are being proposed.

Economic valuation of the environment is crucial for management consistent with the principles of sustainable development. It reminds us that the environment is not a free good, despite a lack of a conventional market. Description of most environmental effects in the language of economics reduces a risk of arbitrary decisions and makes indexes of economic development more reliable. Valuation of elements of the environment may also be useful when determining fees and penalties for environmental offences (Panaszuk 2010).

In Poland the first publications indicating the economic value of the natural environment concerned forested areas. They were studies of employees of the Forest Research Institute in Warszawa, which discussed valuation of non-economic functions of forests. Authors investigating these problems include e.g. Marszałek (1985, 1976), Klocek (1999), Płotkowski (1998), Gołos (1998,) and Zając (2001).

More extensive attempts at the valuation of environmental value were undertaken in the 1990's and they were conducted at the Warszawski Ośrodek Ekonomii Ekologicznej (Żylicz 2000). They were based mainly on the contingent valuation method and travel costs. A relatively small number of such studies have been conducted to date. Unfortunately, not all these attempts have been successful. This was caused by imprecisely formulated questions, a small experimental sample, a lack of response or unclear responses concerning costs of lost time or acceptance of amounts they would accept for environmental losses (Zydróż, Szoszkiewicz 2013).

This research was based on data coming from questionnaires conducted both in the Wielkopolska National Park, in communes located in the vicinity as well as on the Internet. A total of 1450 questionnaires were collected, which were used as a source of information to determine the social value of the park (however, some questionnaires were not used, because they were incomplete). The questionnaire was prepared on the basis of studies by Gołos (2001), Georgiou (1996), Bateman (2000) and Glur (2004) and it consisted of three parts. The first part presented the objective of the questionnaire, as well as characteristics and history of the Wielkopolska National Park. The second part of the questionnaire consisted of 27 questions, both closed and open, which concerned preferences of respondents and visits to the park. The task of this fragment of the questionnaire was to supply answers on costs and time of travel to the recreation site, willingness of the respondents to donate a certain amount of money for the visited site or in the case of a lack of response or a negative attitude to incurred costs for environmental protection – determination of causes for such a behaviour. The objective of these questions was also to estimate, what amount of money park users would accept as compensation for prevention of their access to the park or what amount they would donate for the possibility to use the park. The questionnaire was completed with socio-economic questions.

In order to determine attributes affecting the value of undeveloped real property in communes selected for the study and located in the immediate vicinity of the Wielkopolska National Park data on sale-purchase prices of real property was collected from the County Centre for Geodesy and Cartographic Documentation in Poznań. Due to the varied areas of plots the price of 1 m² undeveloped real property allocated for building purposes in the selected commune was assessed depending on such characteristics as the occurrence of forests, surface waters and protected areas at a distance of max. 1000 m, access to roads, high voltage power infrastructure, sewerage and water supply infrastructure, distance from Poznań, the number of inhabitants in the district, plot area and land function (Mueller 2014). All sale-purchase transactions of undeveloped land in a selected commune in analysed years were considered. Distances from forested areas, surface waters, protected areas and from Poznań were measured as distances resulting from maps.

In order to analyse the collected material mathematical models describing cause and effect relationships were used (logit analysis, contingency tables, multiple regression, Principal Component Analysis (PCA) and canonical correspondence analysis (CCA)).

Objective 1. Determination of factors differentiating willingness of respondents to incur costs for the Wielkopolska National Park

The logit regression model was constructed in order to determine whether there is a willingness among the public to incur costs for the Wielkopolska National Park (WNP). When analysing empirical significance levels it was found that the willingness to pay fees for use of goods of the Wielkopolska National Park depends mainly on the knowledge of respondents on nature value of the Wielkopolska National Park, their membership in ecological organisations and on their opinion on financial requirements of environmental protection. Assessed regression coefficients for these variables are characterised by positive values, which shows that with an increased social awareness of respondents their willingness to incur costs for the Wielkopolska National Park increases. When analysing responses to questions in the questionnaires it was observed that the declared amounts for use of goods of the Wielkopolska National Park were very low. These amounts ranged from 10 złotych to 100 złotych (around a dozen people declared 150 złotych and more). On this basis it may be concluded that respondents aware of the importance of environmental goods support spending large amounts of money for the possibility to use WNP. However, they decided that environmental protection requires high outlays, but it is not the local community, which uses the services of the Wielkopolska National Park should be burdened with additional costs. This may result from the fact that local communities on the one hand believe that they are interested in environmental issues (it is a value in itself), while a on the other hand despite their beliefs they do not want to incur any financial costs connected with the functioning of the Wielkopolska National Park (Zydrón, Kayzer 2015 – 3.b1).

In the analysis of collected questionnaire data the Principal Component Analysis (PCA) and canonical correspondence analysis (CCA) were also used. PCA made it possible to identify main directions in matrix variability of answers given by respondents. PCA showed that the first factor was connected with the knowledge of respondents on WNP. We need to stress that this factor was strongly related also with the frequency of visits to WNP. The first factor explained 14% variance. The second direction of variation, which explained 13% variance, referred to education and age of respondents. The oldest respondents were at the same time the best educated. The second factor explained 13% variance. The third of identified factors explained almost 13% variance and referred to the willingness to incur costs for nature conservation. This factor was connected directly with these two questions in the questionnaire:

- the amount of declared annual fee,
- support for environmental expenditure.

Canonical correspondence analysis (CCA) showed preferences of individuals working in different jobs in relation to variables, which significance was shown in PCA. This analysis showed that among professional groups most willingly declaring spending money on environmental causes are entrepreneurs, foresters and pensioners. Farmers are the group least willing to incur costs for environmental causes, while they most willingly declare contributing labour for WNP. Questioned farmers showed sensitivity to nature conservation causes, but due to their lower financial resources they were rather willing to contribute labour rather than donate money.

Studies using CCA and PCA showed that support for incurring costs for environmental causes is not connected either with education of respondents or their knowledge on WNP and frequency of visits to WNP. Studies did not confirm any dependence between the income of respondents and incurring costs for environmental causes, which may be considered inconsistent with the theoretical income elasticity, which defines relationships between income and willingness to pay for the environment (Carson et al. 2000). PCA showed that income per person in the family of respondents was only to a limited extent connected with the factor, which was defined both by the support for environmental expenditure and the amount of declared annual fee. Among professional groups entrepreneurs, foresters and pensioners were most willing to declare spending money for environmental issues. Farmers were least willing to incur costs for environmental issues, while they were most willing to declare contribution of labour for WNP. It may be concluded that despite limited financial means farmers appreciate the monetary value of the park and are aware of joint responsibility for its maintenance by declaring willingness to work for its sake (Zydrón, Szoszkiewicz 2013 - 3.b.2).

Objective 2. Determination of factors differentiating the amount of compensation for prevention of use of the Wielkopolska National Park.

In the evaluation whether respondents expect compensation in the case of a hypothetical ban on the use of goods of the Wielkopolska National Park the tools of the logit model were also applied. When analysing the results of testing the significance of individual explanatory variables it was found that the level of expected compensation in the case when respondents could not use goods of the Wielkopolska National Park depend on the following variables: age of respondents, mean net income per person in the family, opinions on the financial requirements concerning environmental protection and on distances from WNP. The positive effect on this phenomenon was connected with age (older individuals expected a higher level of compensation), while a negative effect was found for the other factors. It may probably be stated that with a decrease in income in the society the willingness increases to obtain compensation in the case of impossibility to use goods of the Wielkopolska National Park. When analysing these results it may be observed that individuals with average and relatively high income do not require compensation for prevention of use of WNP, while individuals with low income expect high financial compensations.

Respondents visiting WNP and aware of its nature value do not expect compensation for impossibility to use it. It may be assumed that this was probably caused by the fact that they do not believe WNP will no longer be accessible for tourists (Zydrón, Kayzer 2015 – 3.b1).

The positive effect on the investigated phenomenon was connected with age (older individuals expected a higher level of compensation), while the negative effect was found for the other two factors. Respondents declaring the need to spend large amounts on environmental protection did not expect compensation for prevention of use of goods of WNP. Studies by Mitchel and Carson (Prince 1989) and Nowacki (2009) showed that the amount of the declared amounts for the prevention of use of the environment depend on income, education, profession, composition of the visiting group, demographic and

psychological factors. Also this amount to a considerable extent is dependent on characteristics of this attraction, such as quality of services and infrastructure.

Parameters at the other variables assumed for the model proved to be non-significant at the significance level of 0.05. Despite the non-significance of the parameter I need to stress the dependence between net income per person and the tested explanatory variable. It indicates that with a decrease in income the public becomes increasingly willing to obtain compensation in the case of the use of goods of WNP is prevented (Zydrón, Kayzer, Szoszkiewicz 2014 - 3.b.3).

We may agree with the opinion of Czajkowski (2008) that the contingent valuation method based on answers of respondents, who declare their behaviour in a hypothetical situation, provides also high elasticity and valuation of goods, for which there is no market and which otherwise may not be valued. This method makes it possible to assess the degree of significance of individual characteristics of protected areas and state willingness to pay for them. Direct interview in the contingent valuation method provides direct estimates of interested individuals, which is an obvious advantage of this method. However, this method has its limitations, such as e.g. the fact that the way a question is asked affects the response and the willingness to pay and the capacity to pay are two different things. People may value a given good or service highly, which does not mean that they are sufficiently rich to pay for it (Rauba 2011). The study refers to a certain hypothetical situation forcing respondents to speculate and it does not guarantee that if they were to pay, the decision would be the same (Bateman et al. 1995).

Respondents visiting WNP and aware of its nature value do not expect compensation for prevention to use it. It may be assumed that probably this is caused by the fact that they do not believe in a situation when WNP will no longer be accessible for tourists. Willingness to obtain compensation for the possibility to use the park is manifested by respondents, who rarely visit WNP, live near the park, do not belong to ecological organisations and have a low net income per person.

Objective 3. Analysis of willingness of respondents to incur costs for the Wielkopolska National Park and obtain compensation for prevention of use of WNP.

A major task was to determine whether a change in the values of WTA and WTP is influenced by the distribution of the number of the analysed levels of investigated factors. To verify differences in answers to the question on valuation depending on analysed variables (i.e. population groups), the zero and an alternative hypotheses were formulated. In the case of rejection of the zero hypothesis on a lack of difference in answers to questions on valuation according to analysed variables it was found that the answers of individuals from different groups are determined by this division. When analysing the results it was observed that both the willingness to incur costs for WNP and acceptance of compensation is influenced by the frequency of visits to WNP. It was observed that among respondents the greatest numbers were of the individuals, who visited WNP several times a year or once a month. Among these individuals over 70% have a positive attitude to payments for the park.

Respondents in their own opinion having a moderate or poor knowledge on WNP are willing in over 70% to pay for the possibility to use the Park. In turn, in the case of the hypothetical acceptance of compensation the population of respondents is divided 50-50 in terms of the declared knowledge on WNP. When analysing the collected questionnaire material no relationship was recorded between WTA and the status of knowledge on the Park. The declared status of knowledge on the park determines willingness to incur costs for the environment, while in turn, it does not affect the willingness to accept the hypothetical compensation in the case the use of WNP is impossible.

Willingness to work for WNP as volunteers was not declared by over 80% respondents. This means that among respondents there is no habit generally found among tourists, e.g. national parks located in the Polish mountains, to care and maintain cleanliness of tourist trails irrespective of actions of Park wardens. A vast majority of individuals ready to support the park as volunteers are ready to pay fees for WNP, which implies the shown dependence between willingness to work for the park and WTP. In turn, we may not indicate a similar dependence between willingness to work for the park and WTA.

When considering the age of respondents a dependence may be observed that the greatest number of individuals below 25 years are willing to incur costs for the park e.g. paying for entrance to the Park. In turn, among individuals, who are willing to accept compensation – individuals from two age groups predominate in percentages (26-40 and 41 and more years). It may be observed that there is a considerable dependence between age and WTP and WTA, while the change in age causes a change in the attitude to incur costs or accept compensation.

When investigating the comparison of respondents living in Poznań and towns around WNP the place of residence was found to have no effect on WTP or WTA. Respondents depending on the size of their place of residence have the same attitude to the value of the natural environment. Based on observations of public behaviour we may observe another type of preferences of respondents in a given case. It was commonly observed that individuals from large cities most frequently have the most radical opinions on problems of environmental protection.

When analysing comparisons between mean net income per person in the family and willingness to incur costs for WNP and accept compensation for prevention of use of WNP I found no significant dependences between these factors. Based on the results of the questionnaire the financial standing is not reflected in answers to questions on the valuation of WTA and WTP.

When analysing the collected questionnaire material no dependence was found between education of respondents and WTP. Individual homogeneous groups in terms of their education have similar percentages of Yes and No responses in terms of WTP. In turn, for the dependence between education and WTA it was observed that the social group having higher education exhibits a lesser willingness to obtain compensation for the hypothetical refusal to use WNP. In the other groups with similar education we may observe that Yes and No responses have a 50-50% distribution. Based on the conducted analyses we may see that individuals with higher education do not expect compensation for refusal to use WNP, since they consider nature as a value by itself.

Answers of respondents to questions concerning valuation of WTA and WTP in combination with answers on the opinion on financial requirements of environmental protection confirmed the adopted assumption. Based on the results of empirical significance levels it was found that answers of respondents to the question concerning their opinion on incurring high costs on environmental protection are consistent with answers on WTA and WTP. The stronger the agreement of respondents to incur costs, the more willing they are to pay for WNP and the less willing they are to obtain a hypothetical compensation for the impossibility to use the Park.

Based on the analysis of the number of answers by respondents concerning membership in ecological organisations it may be observed that the dependence between this factor and WTP and WTA. A lesser percentage of individuals, who declare that they do not belong or have never belonged to ecological organisations, is willing to incur costs for WNP and at a lesser percentage to obtain compensation for the prevention of use of WNP.

When analysing the distribution of answers it may be observed that over 95% respondents never belonged to ecological organisations. Based on these studies it may be assumed that the public is interested in ecology, but they do not intend to participate in ecological associations.

When analysing results of the questionnaire concerning WTP in terms of age and division into sexes of respondents no significant differences were found in answers. It may be observed that the greatest consistency is found among men and women aged 25 – 40 years, while it was lowest in the range of 41 and more years (based on values of empirical significance coefficients). It was observed that in the age group of 41 and more years the number of men, who do not want to pay for WNP, is greater than the number of women in this age group.

When analysing the collected questionnaire material concerning the dependences between WTA values and age and considering sex of the respondents it was found that the dependence is significant. The greatest difference was observed for the age group of 25 – 40 years, the number of men in this group expressed a 50% willingness to obtain compensation, in contrast to the group of women, in which approx. 3 time more respondents do not expect compensation. In the group of 41 and more years it may be observed that the answers of women and men to the questions concerning WTP are practically identical.

When considering the collected research material assessing the dependence between WTP, and the division in terms of sex and mean net income per person in the family no interdependence was found between these factors. It was observed only that in the group aged up to 25 years more women than men declared that they are willing to obtain compensation for the hypothetical rejection to use WNP. The two other age groups had identical percentages of individuals giving Yes and No answers.

When analysing the collected questionnaires concerning the dependences between WTA and the division in terms of the sex of respondents and mean net income per person in the family, similarly as in the case of WTP, these factors were found not to interact significantly. It was only observed that the percentage of answers given by women in the groups up to 25 years and 26 – 40 years is slightly higher than for the answers given by men in these groups. In turn, the percentage of identical answers in the group 41 and more years old given by women and men is similar (Zydrón, Kayzer 2015 – 3b.1).

Objective 4. Determination of social value of the Wielkopolska National Park using the Contingent Valuation Method (CVM) and Travel Cost Method (TCM).

Using contingent valuation method (CVM) the research process was based on two valuation methods, i.e. WTP (Willingness to Pay) based on the amount which respondents are able to spend in exchange for the possibility to use the park or abstain from activities which may deteriorate its value, and WTA (Willingness to Accept) using the amount, which they would like to accept as compensation for the lost possibility to use WNP.

Based on data from the tested population of 1350 respondents the mean value of WTP was assessed as 44.96 złotys. The highest mean amount for the protection of WNP were declared to be spent by females (63.3 złotys), individuals aged over 60 years, respondents with elementary education, net income < 100 złotys/person, and respondents living in the country, being passive members of environmental organisations and having a very positive attitude to environmental fees. At the same time the lowest amount to be spent was declared by respondents with such socioeconomic characteristics as vocational education, net income of 500-1000 złotys/person, aged 18 – 25 years, and respondents living in medium-sized towns, opposed to environmental fees and not belonging to any environmental organisation.

Respondents asked to declare the acceptable value of WTA assessed it as 111.36 złotys. In the investigated population the individuals who gave the highest mean amount of compensation were men (255.85 złotys), and respondents with vocational education, having net income < 100 złotys/person, and respondents aged 25-40 years, living in big cities, individuals greatly opposed to environmental fees and not belonging to any environmental organisations. In turn, the least willing to determine compensation were women, individuals with elementary education, with net income of 100-200 złotys/person, and respondents aged 26 - 40 years, living in the country, individuals opposed against fees and active members of environmental organisations. At the same time in a vast part of the analysis mean values of WTA exceeded mean levels of WTP specified by respondents.

In order to express the social value of the Wielkopolska National Park the obtained mean values of WTA and WTP were referred to the mean number of park visitors, which according to the information on the park website (www.Wielkopolskapn.pl) is 1 200 000 individuals and thus the following results were obtained:

In terms of WTP and volunteer work the value of WNP was 149 581 395 złotys

In terms of WTA the value of the park was established at 133 632 353 złotys.

The social value of the Wielkopolska National Park was estimated using the Travel Cost Method. According to this method the value of WNP was established based on total travel costs incurred by individual park users in the investigated sample.

The collected material and conducted analyses show that the Wielkopolska National Park is visited on average 30.01 times a year. In turn, the greatest number of visits is reported by individuals living within a radius of 40 km from the park. In order to reach the park respondents cover on average 75 km, while the car is the most frequently selected means of transport. Based on the received answers it was calculated that the total costs of travel for all park users was 10 991.13 złotys. In turn, for individual respondents this cost was assessed at 61.06 złotys. Respondents to a great part do not use the tourist facilities of the park, while at the same time they are convinced of its low standard. Total travel costs in the investigated

population were estimated at 55 164.23 zlotys, which on average per 1 user of WNP was 306.47 zlotys.

In order to express the social value of the Wielkopolska National Park the mean value of TCM was referred to the mean number of individuals visiting the park a year (1 200 000 individuals) giving 367 764 000.00 zlotys (Zydrón, Kayzer 2015 - 3.b.1).

Objective 5. Analysis of the effect of protected areas on the value of real property

Nature conservation paradoxically leads to mindless urban sprawl in areas neighbouring protected areas. Plots allocated to building development purposes located in these areas are characterised by an increased value in comparison to plots located at a distance of several kilometers. Analyses were conducted on prices of 1 m² undeveloped real property allocated to building development purposes in two communes of Dopiewo and Mosina located in the vicinity of the Wielkopolska National Park. Inference was conducted using multiple regression tools. The applied linear model to estimate prices of real property is a relatively objective method and at the same time a simple method to determine the effect of attributes on the value of real property. It was assumed that the value of real property should be positively connected with such characteristics as forests, waters, protected areas and possibility to connect the real property to the gas grid and it was negatively affected by the high voltage lines in the immediate vicinity. Analyses were conducted based on all sale-purchase transactions (656 transactions) for undeveloped land in the Mosina commune in the years 2004-2007 and in the Dopiewo commune in the years 2009-2013 (685 transactions).

When analysing results of testing the significance of individual explanatory variables it was found that the price of 1 m² undeveloped real property allocated to building development purposes in the Mosina commune depended mainly in the years 2005 - 2007 on distances from Poznań, while additionally in the years 2006 and 2007 – also on plot area. Regression coefficients significantly different from zero for individual years showed a negative effect on the analysed transaction prices. This means that with an increase in the distance from forested areas and with an increase in the plot area the price of 1 m² real property decreased. When analysing the empirical values of the other factors it was found that in 2004 the price of 1 m² was relatively high for areas located at a small distance from a high voltage line. Positive values in the assessment of regression coefficients for this variable indicate that buyers of these real property did not take into consideration the fact that the high voltage line may have a negative effect on health of inhabitants. Results of modelling prices of 1 m² undeveloped real property in the years 2004-2007 show that the sale price for plots in those years a negligible effect was recorded for distances from forested areas, waters or protected areas. Additionally in the years 2004-2007 sold building plots had no access to the gas grid. Next regression coefficients and empirical values of significance levels were assessed for the multiple regression model taking into consideration the variation connected with the year of sale. Based on the model of multiple linear regression it was recorded that years, in which transactions were concluded, significantly affected the price of 1 m² undeveloped real property allocated to building development purposes in the Mosina commune. The positive value of the regression coefficient means that the average price of 1m² increased in successive years. In turn, results of reverse stepwise regression model

suggest that the primary cause for the increase in prices was variation connected with the distance of plots from Poznań and their area.

When investigating testing results of significance for individual explanatory variables it was found that the price of 1 m² undeveloped real property allocated to building development purposes in the Dopiewo commune in 2009-2013 depended mainly on the distance from Poznań and from forested areas. These variables were characterised by a negative effect on analysed transaction prices (except for the distance from forested areas in 2009). This means that with an increase in the distance from forested areas and with an increase in the distance from the Poznań city limits the price of 1 m² real property decreased. When analysing empirical values of the other factors it was found that the distance of the real property from waters in the years 2009 and 2011 influenced the price of 1 m². Additionally, only in 2011 the distance to protected areas and plot size significantly influenced the price of 1 m² real property.

When analysing values of regression coefficients and empirical values of significance levels for the multiple regression model considering variation connected with the year of sale it was found that years, in which transactions were concluded, significantly influenced the price of 1 m² undeveloped real property allocated to building development purposes in the Dopiewo commune. Additionally, the effect of 2011 distance from waters (also for 2009 of this attribute) and plot size on the price of 1 m² real property in 2011 was highly significant, since it implies the significance of these factors for the model in terms of years, in which sale-purchase transactions were concluded.

Based on the conducted analysis it was found that the value of undeveloped real property was influenced by various factors, first of all plot area and distance to forests. Also other authors showed a dependence between plot size and transaction price (the greater the plot, the lower the unit prices) (Żróbek, Belej 2000, Prystupa 2001 and Bitner 2010). Differences in results given by individual authors are probably the consequence of assumptions in the selection of data for calculations. It is usually assumed that the analysed real properties have to differ only in one characteristic, which is difficult to provide in practice – finding around a dozen real properties differing in only one characteristic (Bitner 2010). In our analysis, similarly as in a study by Bitner (2010), we included all transactions on the market using all the available information on the price – area dependences.

As a result of the analyses using the regression method we may agree with Bitner (2010) that the application of linear models in estimation of real property is justified due to the objective and simple method of determining the effect of attributes on the value of real property.

In turn, a drawback of the multiple regression includes relatively (e.g. in relation to neural networks) small values of coefficients of determination. This is caused by the frequent occurrence of outliers in analysed sale-purchase transactions, which affect the value of sum square of errors. Squares of errors are to a greater extent dependent on outliers than on those, for which the model is better fit.

In my opinion the most important accomplishments in these publications include:

1. Development of the research method and elaboration of results: determination of the social value of areas of nature value using the contingent valuation and travel cost methods, and analysis of attributes affecting the value of undeveloped real property – taking into consideration nature value.
2. Identification of factors affecting public willingness to incur costs Willingness to Pay (WTP) for the environment. It was shown that public willingness to pay fees for the use of goods of the Wielkopolska National Park depends mainly on the state of knowledge of respondents on the nature value of the park, their membership in ecological organisations and their opinion on financial requirements of environmental protection. With an increase in social awareness of respondents their willingness to incur costs for the Wielkopolska National Park increases. In turn, the distance from the residence of respondents, their education, size of town of residence and the frequency of visits to WNP had no effect on the willingness to pay for the Park.
3. Indication of factors affecting the level of expected compensation - Willingness to Accept (WTA) in the case of respondents being unable to use the goods of nature. It was shown that WTA depends on the following variables: age of respondents, mean net income per person in the family, opinions on financial requirements concerning environmental protection and on the distance from WNP. Older individuals expected a higher level of compensation; in turn, it may be stated with a high probability that public willingness to obtain compensation in the case of the hypothetical inability of respondents to use the Park increases with a decrease in income levels. Individuals with average and relatively high incomes do not require compensation for rejection to use the WNP, while in turn individuals with low incomes expect high compensation. Respondents visiting WNP and aware of its nature value do not expect compensation for being unable to use it. It may be assumed that this is probably because they do not believe that WNP will no longer be accessible for tourists. The state of knowledge of respondents on WNP, their education and willingness to work for WNP e.g. as volunteers were found to have no effect on willingness to obtain compensation for the hypothetical prohibition to use the goods of WNP.
4. Indication of attributes having a significant effect on the value of undeveloped real properties located near protected areas. When analysing the effect of attributes on the value of undeveloped real properties allocated to building development purposes in the communes of Mosina and Dopiewo (communes, in which WNP is situated) it was found that prices of 1 m² plots were influenced first of all by the distance to Poznań, plot area, distance to forests and surface waters (rivers, lakes). In the analysed years 2004-2007 for the Mosina commune and 2009-2013 for the Dopiewo commune it was recorded that with the increase in the distance of plots from the Poznań city limits the unit price of plots decreased. The general trend for the larger plots to have lower prices of 1 m² is no longer obvious. As it was observed, in the Mosina commune in the years 2004-2007 it was a significant factor affecting the price of 1 m², while in turn, for the

Dopiewo commune this factor was significant only in 2011. This was probably because plots may be divided into several smaller ones in order to obtain higher prices and as a result of decreased supply of plots on the market at increasing demand. It was observed also that the trend for the level of plot prices changes depending on the distance to forests and surface waters. This dependence was not observed to be significant for sale-purchase transactions for the Mosina commune; in turn, this trend changed for the Dopiewo commune. This means that with time the vicinity of forests and surface waters was increasingly appreciated.

5. Indication that studies using contingent valuation and travel cost methods determined the high social value of the Wielkopolska National Park. Based on these studies I may state that these methods may be applied in the modern practice of national park management (as an auxiliary element), since on their basis we may conclude whether the operations of the park management are considered positive by the public opinion. Conducting periodical studies on the social value of the park (it is proposed - every 10 years, as e.g. in the case of Forest Management Plan, or every 20 years as in the case of the Protection plan) we may establish which elements of the environment in the public opinion are improved and which are degraded. Based on such studies we may identify not only changes in the environment as perceived by the public opinion, but also what needs to be improved in terms of tourism in the Park. Application of such studies in practice will aid management of protected areas in terms of sustainable development fully incorporating requirements of both nature conservation and public needs. National parks are to serve first of all nature conservation needs, but we must also remember of human needs connected with tourism.

5. Discussion of other scientific and research accomplishments

The primary direction of my scientific activity is to investigate methods to valuate production and non-production, particularly public functions of forests, as well as establishment of attributes affecting the value of undeveloped real properties (including nature conditions).

Prior to receiving the scientific degree of doctor I investigated the applicability under Polish socio-economic conditions for methods to determine income value of forest land not covered by tree stands (methods by Faustmann, Bauz, Martineit and the land rate estimate method applied by property appraisers). Moreover, I investigated problems with determination of the forest interest rates, which may be applied in contemporary forest management. My research concerned also comparative analyses of farmland and forest land valuation in Poland and other European countries. Results were published in many national journals (Podgórski Zydrón A 2001- II. D.1, Zydrón 2002 - II. D. 2, Buraczewski, Zydrón 2004 - II. D. 3, Zydrón 2004 - II. D. 4 , Zydrón 2005 - II. D.5 , Zydrón 2006 - II. D. 7, Zydrón, Walkowiak, Moliński 2007 - II. D. 8).

After receiving the PhD degree

I continued research within the framework of my PhD dissertation while also investigating other fields of science connected with spatial planning and valuation of ecosystem services.

After receiving the PhD degree my other scientific and research activity may be classified to four subject groups:

1. Studies on the applicability of income valuation of forest land not covered by tree stands under Polish socio-economic conditions.
2. Analysis of socio-economic development based on planning studies.
3. Designing afforestation in spatial planning.
4. Analysis of changes in the land use and ownership structure in the Wielkopolskie province.

1. Studies on the applicability of income valuation of forest land not covered by tree stands under Polish socio-economic conditions.

I conducted comparative studies on various methods to calculate the value of forest land together with employees of the Department of Mathematical and Statistical Methods of the former August Cieszkowski Agricultural University, at present the Poznań University of Life Sciences. The aim of the research was to compare income methods for the valuation of forest land not covered by tree stands by Bauz, Riebl, Martineit, Faustmann, Glaser, and estimate land rate methods applied by property appraisers. The valuation methods were compared for individual forest site types in selected forest divisions (17 forest divisions administered by 5 regional directorates of the State Forests). Analyses were conducted using cluster analysis combined with the calculation of correlation matrices. Statistical analysis showed a close relationship between the methods developed by Glaser, Riebl and Standard. Based on these studies we may state that the estimate land rate method used by property appraisers (Standard) could be replaced with income methods by Glaser or Riebl. Application of income methods in valuation of forest land not covered by tree stands would contribute to the development of modern methods to value forest land taking into consideration productivity of a given forest site type (Zydrón, Walkowiak, Moliński 2007- II.D.8, Zydrón, Walkowiak 2012- II.D.16).

Within the framework of research I also analysed the applicability under Polish socio-economic conditions for valuation of forest land applied in other European countries. I reviewed valuation methods for forest land not covered by tree stands in selected European countries (Germany, Sweden, Russia). I also analysed the market for forest land not covered by tree stands in selected areas within administrative boundaries of forest divisions. Based on these studies I found an increased number of transactions in such real properties in the years 2004-2007. I applied in the analysed areas the methods of the so-called German valuation of forest land not covered with tree stands. Based on the conducted analysis I stated that this method may be applied under Polish socio-economic conditions. This method is simple and increases the possibility to apply the comparative approach for the valuation of forest land not covered by tree stands. Summing up this review of solutions in valuation of forest land not covered by tree stands binding in countries neighbouring with Poland it may be stated that these methods are based on the market value specified in the comparative or income approach. The market value of forest land in Germany is determined using the comparative approach, while valuation of land in Russia and Sweden is based on the income approach, i.e. based on the

income generated by forest. Income is calculated based on the land rent basis (Zydrón 2011 - II.D.10, Zydrón 2006-11. D.7, Zydrón 2014 - II. D. 21).

Within the framework of studies on the applicability of income methods in valuation of value of forest land not covered by tree stands I encountered a problem with the adoption of the amount of forest interest rate in forestry. During my research I analysed forest divisions representing 5 regional directorates of the State Forests, concerning the determination of the amount of forest interest rate based on the annual forest utilisation plan and stand resources. Based on my studies I stated that a more reliable category for the determination of forest interest rate and one better suited for the conditions of modern forest economy seems to be the annual forest utilisation plan and stand resources, which amount fully corresponds to the volume and structure of standing timber resources. Based on my studies I found that the amount of the forest interest rate should be low, i.e. 2%, and also be constant for all forest economies for the sake of simplicity and comparability of results (Zydrón, Szafrąński, Korytowski 2012 - II. A.4).

2. Analysis of socio-economic development based on planning studies.

I conducted analyses of suburbanisation processes based on selected communes of the Poznań county in the years 2001-2010. Based on this research I found that in the analysed communes we may observe progressing suburbanisation manifested in the positive dynamics of changes in the number of inhabitants, population density, housing resources as well as urbanised and developed areas at a reduction of farmland. I also found in the communes located west of Poznań a greater index of dynamics in changes for each analysed suburbanisation factor in relation to the communes situated east of the city centre. I also observed that the suburbanisation process was least intensive in the years 2007-2010, which may be explained by the building boom resulting from availability of mortgage loans and fashion to have a family house in the suburbs (Zydrón, Szczepański 2012 - II.A.3).

I also tried to present the spatial policy of the Luboń town authorities (direct vicinity of Poznań) in terms of its economic aspect. I analysed 13 local spatial development plans together with forecasts of financial effects of their acceptance. I found that e.g. costs of functional transformation of land vary and to a considerable extent depend on the character of the local spatial development plan. Moreover, from the point of view of town budget balance it is very important whether the local plan is conservative, whether it fulfills new functions in previously undeveloped areas (Zydrón, Szczepański 2013 -II. D.17).

I analysed variation in the specificity of spatial policies in selected communes of the Poznań conurbation. The scientific aim of my research was to present differences in the degree of specificity of binding Studies of conditions and directions of spatial management in selected communes of the Poznań conurbation. In turn, the application objective was to indicate the need to develop a uniform planning methodology in terms of the preparation of planning documents of strategic character for areas of suburban agglomerations. Based on my studies I found that an appropriate identification of directions of spatial development for conurbations requires an in-depth analysis of these conditions. For the appropriate analysis it is necessary to ensure comparability of present spatial policies in the communes of the conurbation. For this reason it is advisable for all commune to conduct their

spatial policies at the same possibly high level of specificity and complementarity of their decisions (Szczepański, Pyszny, Zydrón 2013 - II. A. 9).

I also conducted studies, which included comparative analyses of indexes of spatial order at the commune level. The primary aim of my research was to analyse available systems of sustainable development in terms of their suitability to diagnose planning problems arising at the local level and monitor the degree of spatial order. Based on my studies I may state that available indexes of sustainable development are characterised by a lack of parameters for planning analyses, e.g. in the evaluation of spatial order. In turn, rational economy of nature resources and space thanks to appropriate planning decisions is one of the cheapest and most effective methods leading to optimal use of space and increasing its value as well as harmonious co-existence of man and nature. However, we need to remember that some problems may not be measured using indexes. We need to be careful not to treat them as tools in the mechanistic planning process, since they are based on simplification and generalisation of phenomena and processes, which are not always mathematically expressible (Zbierska, Zydrón, Szczepański 2015 - II.D.20).

I conducted analyses of planning documentation and its effect on functional and spatial changes in a selected fragment of the city of Poznań in the years 1975-2008. The aim of this study was to present – based on the fragment of the city of Poznań – changing the approach to spatial planning at the turn of the 20th and 21st centuries in Poland. Looking comprehensively at the time scope of this analysis in terms of the continuation of planning assumptions it may be stated that the analysed area to a limited degree shows continuity of the decision process (Zydrón, Kaczmarek, Szczepański, Zbierska 2014 - II.D.20).

When analysing the functioning of the road communication system in selected communes of the Poznań conurbation in terms of sustainable development I tried to describe the degree of road communication system development and its effect particularly on the existing settlement network and the natural environment. Based on the studies I selected communes, which are at greatest risk of an excessive impact connected with the operation of roads as well as the length of the road network in terms of roads classes and I presented a further direction for studies including the city of Poznań and newly registered cars (Szczepański, Zydrón, Zbierska 2015 - II.D.31).

When analysing the multi-functional development of urban areas based on the Witkowo commune I presented the current status and possibility of multi-functional development of rural areas based on the Witkowo commune. Analyses included demography, agriculture, tourism, the condition of the environment, economic development, water supply and sewerage infrastructure. Based on these analyses it may be stated that the analysed commune showed multi-functional development; however, it is not fully used in relation to the existing potential particularly in terms of the development of agritourism (Zydrón, Grzegorek, Górna 2015 - II. D.35).

3. Designing afforestation in spatial planning.

In my paper “Realisation of afforestation in Poland within the framework of the rural development programme” (Zydrón 2008) I presented objectives and principles of afforestation of farmland within the framework of the Rural Development Programme 2007 - 2013 and their realisation in individual provinces. In the papers (Zydrón, Bober 2013 - II. A.

7, Zydrón Szkilnyk 2015 - II. D. 28 , Zydrón, Gaweł 2014 - II. D. 25) I analysed the possibility to increase forest cover based on communes in the Poznań conurbation - Tarnowo Podgórne, Rokietnica, Buk. Based on my studies I stated that the analysed communes despite high afforestation preferences specified in the National Afforestation Programme are characterised by very low forest cover indexes. This is caused by the high price of low soil quality farmland, which could be allocated to afforestation, but instead are allocated to housing development or income (greater income from this land use). Increase in forest cover expressed in terms of area on the national scale follows the adopted schedule of the National Afforestation Programme; however, the spatial distribution of the afforestation creates problems. Forest cover is increasing in areas, where it is already high, while in areas preferable for afforestation it is very low. High prices of undeveloped land together with the accelerating suburbanisation result in a situation when land suitable for afforestation is allocated to other purposes, mainly housing, for development of industry – as more profitable. Based on these studies we may propose a thesis that neglecting areas for afforestation in spatial management as well as reducing their areas in relation to other uses may in the future have a dramatic effect on the quality of life of the local inhabitants. Another result of my studies was to present the role of ecological corridors in planning documents as a factor of sustainable development. I found that the most important limitation in the functioning of ecological corridors is connected with the disruption of their continuity by infrastructure (roads and railway) and deforestation as well as development of built-up areas, first of all urban sprawl.

When analysing conditions and possibility to increase forest cover in the Poznań conurbation based on communes a spatial concept for afforestation was prepared for the Buk commune taking into consideration guidelines for new forest complexes in the National Afforestation Programme, the Afforestation Programme for the Poznań Commune and guidelines for the establishment of farmland-forest boundaries. The scope of that study included identification of environmental conditions in the Buk commune, based on which the afforestation pattern was designed. Based on the newly designed afforestations the area of forests increased from 3.9 % to 18.9%. The developed afforestation concept included planning documents as well as natural and anthropogenic conditions in the Buk commune. Based on these studies it may be stated that undeveloped land, which could be used for afforestation due to suburbanisation and high land prices allocated to purposes other than forests (housing, industry) – more profitable from the point of view of investors (Zydrón, Szkilnyk 2015 -II.D.28). Also studies covering the Tarnowo Podgórne commune (Zydrón, Bober 2013 - II. A. 7) confirmed that communes located near Poznań for economic reasons do not allocate land to afforestation despite conditions predisposing these areas for forestry. It may be stated that according to this principle afforestation from the point of view of income for communes is unprofitable, for this reason under present socio-economic reasons they may not realise the developed concept. A similar situation is observed nationwide, as we are observing a decline in the areas allocated to afforestation, while the distribution of afforestations of farmland and their intensity indicates considerable spatial variation (afforestations where they should be realised and not in areas of high forest cover) (Zydrón, Bober 2013 - II. A. 7, Zydrón Szkilnyk 2015 - II. D. 28 , Zydrón, Gaweł 2014 - II. D. 25)

4. Analysis of changes in land use and ownership structure in the Wielkopolskie province.

When analysing trends in changes in the land use and ownership structure in the years 1989-2006 in selected communes in Wielkopolska it was found that political and economic changes after 1989 in Poland significantly contributed to ownership transformations and changes in land use structure (Zydrón, Hausa 2010 - II. A.1, Zydrón 2012 - II.D. 14, Zydrón 2011 - II.D. 12, Zydrón 2011 - II.D. 13, Zydrón, Kaczmarek 2012 - II.D. 14.). When comparing statistical data of the Central Statistical Office for Poland and the Wielkopolskie province with the results of studies conducted for selected communes of the Poznań county it may be stated that the trends for changes in land use and ownership structure are similar in character, although they differ in the intensity of this phenomenon.

When analysing changes in the land use and ownership structure following Poland's accession to the EU it was found that in all the analysed communes the total area of arable land decreased. In those communes considerable changes in land use structure were found at small changes in land ownership structure. Based on studies I found a reduced area of arable land at an increase in the area of forests and built-up areas. In land ownership structure we may observe an increase in the share of physical persons at the expense of land owned by the State Treasury. Spatial analysis showed spatial links in the changes of land use and ownership structure between analysed communes (Zydrón, Hausa 2010 - II. A. 1, Zydrón 2012 -II.D. 14, Zydrón 2011 -II.D. 12, Zydrón 2011 -II.D. 13, Zydrón, Kaczmarek 2012 - II.D. 14.).

The most important accomplishments following my receiving the PhD degree within the other aspects of my scientific activity include:

1. Development of methodology for the determination of the level of forest interest rate based on forest resources and utilisation plan. Based on studies it was found that the level of forest interest rate should be low, i.e. 2%, and be constant for all forest economies to ensure simplicity and comparability of results.
2. Indication of applicability of income methods in valuation of forest land and application of forest land valuation solutions used in selected European countries under Polish socio-economic conditions.
3. Evaluation of changes in land use and ownership structure in selected communes of the Wielkopolska region following the political and economic transformation in Poland. Based on these studies I found a reduction of arable land area at an increase in forested areas and built-up and urbanised areas. In the land ownership structure we may observe an increase in the share of land owned by physical at the expense of land owned by the State Treasury.
4. Indication of the possibility and limitations for increasing forest cover in Poland based on the communes in the Wielkopolska region. Studies showed that afforestation preferences of communes contained in the National Afforestation Programme underestimate potential possibility to increase forest cover. It was also

stated that afforestation area increases systematically; however, afforestations are not introduced in areas where they should be. This is caused by high land value (around cities), which could be allocated to afforestation, but instead is used for purposes other than forests - more rational from the economic point of view.

5. List of my entire scientific and research accomplishments

My scientific publication list (for 10 Mai 2016) comprises a total of 93 items, including 49 original research papers and chapters in monographs, 37 abstracts and 8 reports from research projects (Tables 1 and 2). Among the 49 scientific papers 12 were published in journals with an *Impact Factor*.

Table 1. Synthetic presentation of all scientific publications

Type of publications	language	Prior to receiving PhD degree			After receiving PhD degree			Total	
		Individual	Joint	Total	Individual	Joint	Total		
Original research papers									
in journals with <i>Impact Factor</i>	P	0	0	0	2	10	12	12	
Original papers published in peer-reviewed journals	A	0	0	0	0	1	1	1	
	P	4	3	7	6	20	26	33	
Chapters in monographs	P	0	0	0	0	2	2	2	
Monograph	A	0	0	0	0	1	1	1	
Other papers									
Conference and popular science papers	-	7	0	1	1	1	2	3	
Abstracts	-	0	1	1	6	30	36	37	
Reports	-	0	3	3	2	3	5	8	
Total	-	7	8	15	5	60	65	97	

Phd. Adam Zydróż

Załącznik 4: Summary of professional achievements

Table 2. List of publications depending on the scores for journals according to the Ministry of Science and Higher Education classification of 17 March 2016 and IF for the year of publication

Name of journal	The number of publications	The score according to MSHE for a given year	Total score according to MSHE	total IF for the year of publication
Journals with IF				
Sylvan	3	15	45	0.88
Rocznik Ochrona Środowiska	1	6	6	0.231
Annual Set The Environmental Protection	8	15	120	3.964
Other peer-reviewed journals				
Sylvan	1	6	6	-
Barometr regionalny	2	8	16	-
Barometr regionalny	1	12	12	-
Nauka Przyroda Technologie	1	5	5	-
Przegląd geodezyjny	1	6	6	-
Przegląd geodezyjny	1	4	4	-
Roczniki Akademii Rolniczej	1	1	1	-
Przegląd leśniczy	2	1	2	-
Infrastruktura and ekologia terenów wiejskich	1	6	6	-
Ekonomia i Środowisko	1	8	8	-
Zeszyty Problemowe Postępu Nauk Rolniczych	2	6	12	-
PTPN, Prace Komisji Nauk Rolniczych i Komisji Nauk Leśnych	3	2	6	-
Acta Sci.Pol., Administratio Locorum	1	4	4	-
Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu	5	7	35	-
Studia and Prace WNEiZ	3	7	21	-
Studia and Prace WNEiZ	4	9	36	-
Europa Regionum	2	7	14	-
Wycena	1	3	3	-
Allgemeine Vermessungs Nachrichten	1	3	3	-
Monographs/chapters in monographs				
Monographs in Polish	1	25	25	-
Chapters in monographs in English / Polish	2	4	8	-
Total	49	-	404	5.075

*scores for journals for the year of publication

Poznań, 30 Mai 2016

