
The Chosen Socio-Economic Problems of Protecting Valuable Agricultural Land in Natura 2000 Areas in Poland

Submitted 22/12/19, 1st revision 17/01/20, 2nd revision 20/02/20, accepted 15/03/20

Katarzyna Brodzińska¹, Wojciech Gotkiewicz²,
Bartosz Mickiewicz³, Adam Pawlewicz⁴

Abstract:

Purpose: Intensive development of agriculture has led to the loss of many valuable ecosystems and thus to a significant impoverishment of biodiversity in rural areas. In the context of the analysed research problem, i.e. the functioning of agriculture in N2000 areas, Poland is a special country where there are semi-natural unique habitats disappearing in the European landscape. The aim of the study was to assess the effectiveness of conservation measures financed under the EU CAP on agricultural land located on N2000 areas.

Design/Methodology/Approach: The analytical material consisted of the results of surveys using a standardized questionnaire which carried out among 292 farmers (152 organic farmers and 140 conventional farmers) from the the area of N2000 "Biebrza Valley" PLH200008. The assumptions were verified based on the Kruskal-Wallis ANOVA analysis and gamma rank correlation. The analytical material also consisted of EUROSTAT data on the area of the N2000 network and the area of agricultural land covered by this form of protection in EU countries. These data were subject to horizontal and vertical (years 2009-2017) comparative analysis.

Findings: Polish experience regarding the implementation of conservation measures on naturally valuable agricultural land (N2000) allows to state that environmental policy should be based on the idea of socially sustainable agriculture, including ecological sustainability (proper delimitation of areas predestined for protection, their environmental valorisation, development of conservation measures and their implementation, a bonus system for the sustainability of agri-environmental commitments), economic sustainability (the system of agricultural subsidies and/or other solutions to meet the basic living needs of farmers and their families), social sustainability (effective inclusion of local communities in information, education and decision-making processes at the stages of development, deployment and implementation of protection programs).

¹PhD habilitated, University of Warmia and Mazury in Olsztyn, Faculty of Environmental Management and Agriculture, katarzyna.brodzinska@uwm.edu.pl

²Professor, University of Warmia and Mazury in Olsztyn, Faculty of Environmental Management and Agriculture, wgot@uwm.edu.pl

³Professor, West Pomeranian University of Technology in Szczecin, Faculty of Economics, bartosz.mickiewicz@zut.edu.pl

⁴PhD, University of Warmia and Mazury in Olsztyn, Faculty of Environmental Management and Agriculture, adampawl@uwm.edu.pl

Practical Implications: *The recommendations resulting from the conducted research and analyses may be adopted by the institutions responsible for the creation of an environmental protection policy which can improve the effectiveness of active forms of protection in valuable natural habitats that are used for agriculture.*

Originality/Value: *The article indicates the recommendations based on building a lasting relationship between farmers and the protection of the environment.*

Keywords: *Natura 2000 areas (N2000), Common Agricultural Policy (CAP), Agri-environment program, agriculture, biodiversity*

JEL codes: *P16, Z13, Z18.*

Paper Type: *Research study.*

1. Introduction

The specificity of conservation measures under the N2000 network is not to eliminate agricultural activities, but to conduct them so that they do not threaten valuable species and habitats (Evans, 2012; Hermoso, Moran-Ordonez and Brotons, 2018; Lomba *et al.*, 2015). In the case of farms located in N2000 areas, it is particularly important to introduce effective instruments encouraging retardation, i.e. inhibiting the adverse modification of natural environment systems, both by excessive intensification of agricultural production and its abandonment. It is about maintaining the right proportions in spatial management between various economic, social and ecological functions. In connection with the above, the purpose of the work is to develop, based on Polish experience, rules of conduct that will improve the effectiveness of active forms of protection (such as the European network N2000) in valuable natural habitats that are used for agriculture.

2. Literature Review

The development of agriculture is determined by the conditions of the natural environment and has a major impact on its state. The intensive development of agriculture has led to the loss of many valuable ecosystems and thus to a significant impoverishment of biodiversity in rural areas (Bengtsson, Ahnstrom and Weibull, 2005; Benton *et al.*, 2002; Clark and Tilman, 2017; Fuller *et al.*, 2005; Gonthier *et al.*, 2014; Li and Li, 2017; Stoate *et al.*, 2001; Tanentzap *et al.*, 2015; van der Zanden, Carvalho-Ribeiro and Verburg, 2018; Srednicka-Tober *et al.*, 2016) and changes in agricultural landscapes (Busck, 2002; Brotons, MaÑosa and Estrada, 2004; Dronova, 2019; Sliwinski *et al.*, 2019). On the other hand, the reason for these changes is also the abandonment of agriculture in less-favoured areas (Campbell *et al.*, 2008; Corbelle-Rico and Crecente-Maseda, 2014; Cramer, Hobbs and Standish, 2008;

Lambin and Meyfroidt, 2011; Levers *et al.*, 2018; Li and Li, 2017; MacDonald *et al.*, 2000; Sirami *et al.*, 2008).

These processes are global, spatially diverse, and the scale of their occurrence depends on the factors that determine them. In the countries of the European Community, less-favoured areas (LFA)⁵ have been covered by financial support since the mid-1970s, and in the following years other pro-environmental instruments, such as Agri-environmental Program⁶, decoupling direct payments from production volume⁷ and regulations binding the agriculture support system with activities to protect the natural environment and prevent climate change.

The EU, as a union of states, has also taken joint actions to protect the environment, creating the European ecological network Natura 2000 (N2000). The creation of this network was the EU's response to international conventions such as the Ramsar Convention on Wetlands⁸ (Ramsar and Iran, 1971) or the Berne Convention for the Protection of Wildlife and European Natural Habitats⁹ (Campagnaro *et al.*, 2019; Evans, 2012; Pimm, Jenkins and Li, 2018). The basis of the Natura 2000 network are two EU directives – the Birds Directive, adopted in 1979, later replaced by the 2009 Directive¹⁰ and the 1992 Habitats Directive¹¹. The Habitats Directive is a pillar of the protection of biodiversity throughout the European Union, additionally supported by other, newer directives, such as the Water Framework Directive¹².

Until Brexit is completed, the European Union includes 28 countries that are diverse in many ways (including the level of agricultural development, environmental conditions, economic growth). The results of many studies indicate that environmentally friendly farming practices, and even moderately intensive agriculture, do not diminish the natural potential of habitats, even those with high protection priority and their reduction is not justified (Kallimanis *et al.*, 2008; Srednicka-Tober *et al.*, 2016). It can therefore be concluded that, although agriculture is accused of a significant contribution to the progressive loss of biodiversity, various types of habitats protected in Natura 2000 areas owe their origin and protection to

⁵*Council Directive 75/268 on mountain and hill farming and farming in certain less favoured areas (April 28, 1975).*

⁶*Macsharry plan, 1992.*

⁷*Luxembourg (Fischler) reform, 2003.*

⁸*Poland ratified the convention in 1978.*

⁹*Poland ratified the convention in 1995.*

¹⁰*European Parliament and Council Directive 2009/147 /EC of 30 November 2009 on the conservation of wild birds.*

¹¹*Council Directive 92/43/EEC of 21 May 1992 on the protection of natural habitats and wild fauna and flora.*

¹²*European Parliament and Council Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy.*

agriculture. It is estimated that out of 198 listed habitat types in the Habitats Directive 28 (14%) may be threatened by abandoning farming practices (Lomba *et al.*, 2015).

Rational management in the context of conservation measures can mean a sustainable intensification of production, which increases productivity and allows to exclude some agricultural land from agricultural use and to put them under protective measures (land sparing) as well as promotion of extensive agriculture (land sharing) (Green *et al.*, 2005; Steffan-Dewenter *et al.*, 2007; Chappell *et al.*, 2009; Phalan *et al.*, 2011; Fischer *et al.*, 2014; von Wehrden *et al.*, 2014; Law *et al.*, 2015; Peltonen-Sainio *et al.*, 2019).

However, in relation to naturally valuable agricultural land the right direction is extensification of agricultural production. Biodiversity of such areas is associated with extensive agricultural use, and the abandonment of agricultural practices leads to the impoverishment of natural habitats (Lomba *et al.*, 2015; Fischer-Hüftle and Gellermann, 2018; Yakusheva, 2019).

Extensification of agriculture should not mean the marginalization of farmers in economic and social terms. Therefore, socially sustainable agriculture should be the foundation for active programs for the protection of naturally valuable agricultural land. In the opinion of certain authors, the concept of socially sustainable agriculture is a peculiar philosophy of farming (Wos and Zegar, 2002; Palomo-Campesino *et al.*, 2018; Bidegain *et al.*, 2019) connected with environmental awareness of farmers.

It is not easy to build ecological awareness, especially in areas where there is fear of survival, difficult living conditions, low level of education and poor interpersonal and institutional communication (Perepeczko, 2012; Xun *et al.*, 2017; Flemsaeter *et al.*, 2018; Teixeira *et al.*, 2018). However, it is the level of ecological awareness, and thus the understanding of the processes and effects of the devastation of ecosystem elements, which has a decisive impact on human-natural environment relations (Perepeczko, 2012; Kamphorst *et al.*, 2017; Niedzialkowski *et al.*, 2018).

Socially sustainable agriculture, in addition to achieving ecological goals (Hole *et al.*, 2005), should be economically effective and socially acceptable (Rivera-Ferre, 2008; Medland, 2016; Luo *et al.*, 2017; Yakusheva, 2019). In the social plane, sustainable agriculture is seen as a condition for rational management which allows the basic needs of society to be met (Wos and Zegar, 2002).

The dissemination of the idea of socially sustainable agriculture which takes into account not only the environmental, but above all social and economic dimensions, is particularly important in naturally valuable areas, including N2000 (Anderies *et al.*, 2004; Ostrom, 2009). In the context of the conducted considerations, it is worth emphasizing that socially sustainable agriculture is not synonymous with the concept of organic farming (Meemken and Qaim, 2018; Lowry and Brainard, 2019), and therefore the production system does not determine the sustainability of agriculture.

The conventional production system can also be socially sustainable if it covers the three mentioned dimensions of sustainability:

- ecological (extensive production);
- economic (provides income for the farmer and his family);
- social (meets the needs of the farmer).

Therefore, it is important that pro-environmental policy is based on the results of reliable scientific research and the development of such a model of human-nature relationships which will benefit each party (Ihse and Lindahl, 2000; Gibbons *et al.*, 2011; Sutherland *et al.*, 2011; Wright *et al.*, 2012; Babai *et al.*, 2015; Xun *et al.*, 2017; Pullin *et al.*, 2019; Saunders, 2019; Vaca *et al.*, 2019).

In Poland, work on the preparation of the N2000 network began at the end of the 1990s. Initial identification was prepared containing descriptions of the areas, as well as maps of the locations of these areas (Pawlewicz *et al.*, 2015). However, during the creation of the network concept no general inventory of protected habitats and species was carried out, and all work was based on a query of published materials, environmental documentation and knowledge of naturalists (Alexandrowicz, Alexandrowicz and Buczek, 2019; Cent *et al.*, 2015; Boltromiuk, 2012; Cieslak *et al.*, 2015; Glogowska, Szendera and Chmielewski, 2013; Harasymiuk, Szafranko and Pawlowicz, 2017; Maczka *et al.*, 2019).

The pre-selected areas of the N2000 were reduced after public consultations, which in turn caused dissatisfaction among expert communities and NGOs who were involved in the creation of the N2000 network, and was questioned by the European Commission (Gotkiewicz, 2010; Glogowska, Szendera and Chmielewski, 2013; Klodzinski, 2019). The effect of these activities was the publication of the so-called Shadow List of N2000 areas, which contained proposals to supplement the surface of protected areas in accordance with EU criteria. Such extensions took place in subsequent years and, as a consequence of these activities, the N2000 network covers almost 20% of Poland's land area. It includes 849 Special Areas of Conservation (SACs) as well as 145 Special Protection Areas (SPAs).

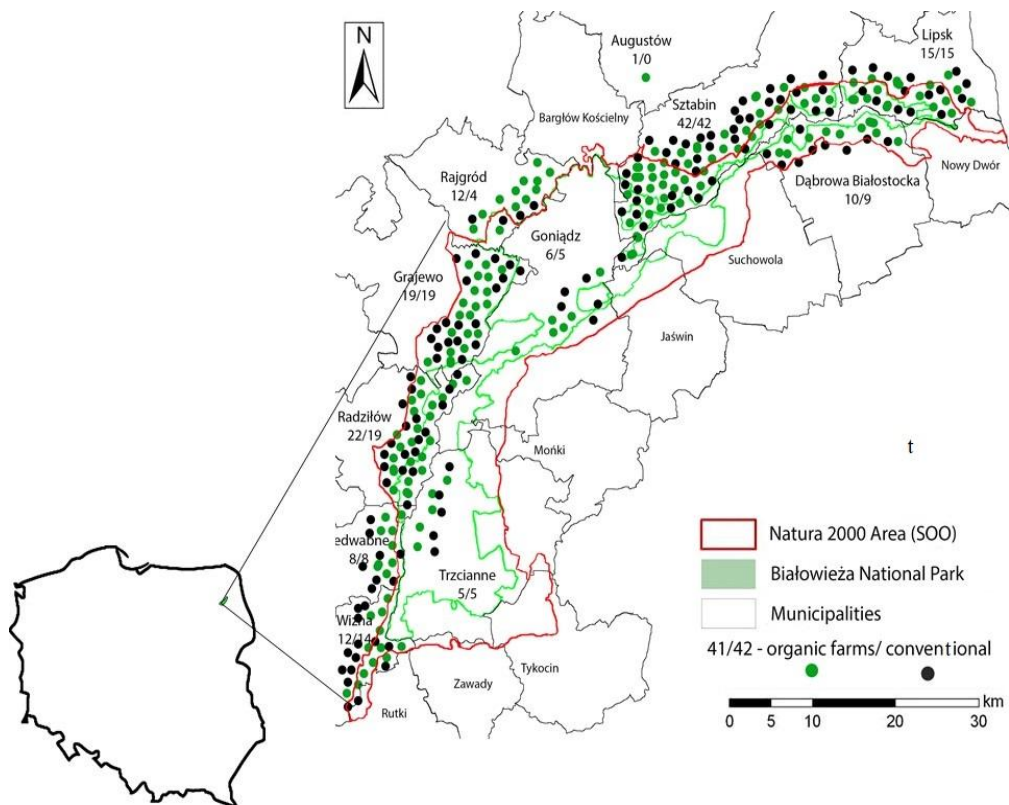
Poland is a special country in the context of the analysed research problem, i.e. the functioning of agriculture in N2000 areas. Poland's natural richness consists in, among others, the occurrence of semi-natural unique habitats, which are disappearing in the European landscape, where refuges of rare and endangered species of fauna and flora are located (Staniak, 2009). At the same time, it is a country where for years both the development of the agricultural sector and landscape transformations have been hampered by socio-economic conditions (Switek *et al.*, 2017). Integration with the EU and providing Polish farmers with financial support under the CAP (uniform area payment, LFA payments, agri-environmental payments, support for investments in agricultural holdings) contributed to the development of agricultural holdings and the

restoration of agricultural use of previously abandoned agricultural land (agricultural abandonment) (Mickiewicz, Mickiewicz and Sobala, 2013).

3. Methodology

Field studies were carried out in 2016 and covered farmers whose agricultural plots are located in the area of N2000 "Biebrza Valley" PLH200008, although the place of residence of some farmers is outside of this area. Surveys using a standardized interview questionnaire were carried out among 292 farmers, including 152 operating organic farms (green colour) and 140 farmers farming in a conventional system (black colour). They covered all owners of organic farms registered in the Main Inspectorate of Agricultural and Food Quality (MIAFQ) organic farm registration system in the area of the N2000 "Biebrza Valley" PLH200008 and owners of conventional farms adjacent to organic farms (Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.).

Figure 1. Area of N2000 "Biebrza Valley " PLH200008 and location of farms covered by the research



Source: Own research.

The choice of area for research was purposive because both the natural and landscape value of this area is considered unique on the national and European scale. In the Biebrza Valley, more than 920 species of vascular plants have been found, of which 67 are legally protected, and 45 are on the "Red list of endangered vascular plants in Poland". A great diversity of habitats occurs there (including poor fens, mires and Molinion), but above all it is a bird sanctuary. There are at least 43 species of birds listed in Annex I of the Birds Directive, of which 25 have been placed on the list of endangered birds in the "Polish Red List of Animals". Biebrza Valley is the most important Aquatic Warbler refuge in Poland and in the European Union.

The analytical material also consisted of EUROSTAT data on the area of the N2000 network and the area of agricultural land covered by this form of protection in EU countries, as well as data on the area of AA (agricultural area) in Poland covered by financial support under the protection of valuable natural habitats and endangered bird species in N2000 areas obtained from the ARMA Management Information System. These data were subject to horizontal comparative analysis in the so-called 'old member states' EU (15) and 'new' EU (13), which joined the EU in 2004 and later.

The area of AA in Poland covered by financial support as part of the agri-environmental-climate program package "Valuable natural habitats and endangered bird species in N2000 areas" was analysed in the vertical system (years 2009-2017). Socio-economic problems of protecting valuable agricultural land in N2000 Areas mainly concern the effectiveness of conservation measures financed under the EU CAP. Therefore, it is important to know the answers to the following research questions:

- Whether and to what extent has the change in the subsidy rules for the nature package in the N2000 areas in Poland affected its scope of implementation?
- Is the system of financial support for farmers in N2000 areas essential in order to protect valuable natural habitats that are used for agriculture?
- Does the location of a farm in N2000 areas, resources (area of UAA, human capital) and production system (conventional, organic) affect its functioning and financial result?
- Does the scope of undertaken pro-environmental projects in the areas of N2000 depend on the system of financial support, substantive support of advisory institutions and quality of human capital (farmers)?

The assumptions were verified based on the Kruskal-Wallis ANOVA analysis and gamma rank correlation. The compared samples were obtained from populations with the same distribution. The differences between the individual categories were presented graphically in the form of histograms (Luszniewicz and Slaby 2001). If the data were non-numeric and could not be ranked, the Chi-squared (χ^2) response frequency matching test was used to compare the two data groups (Gibbons, 1985).

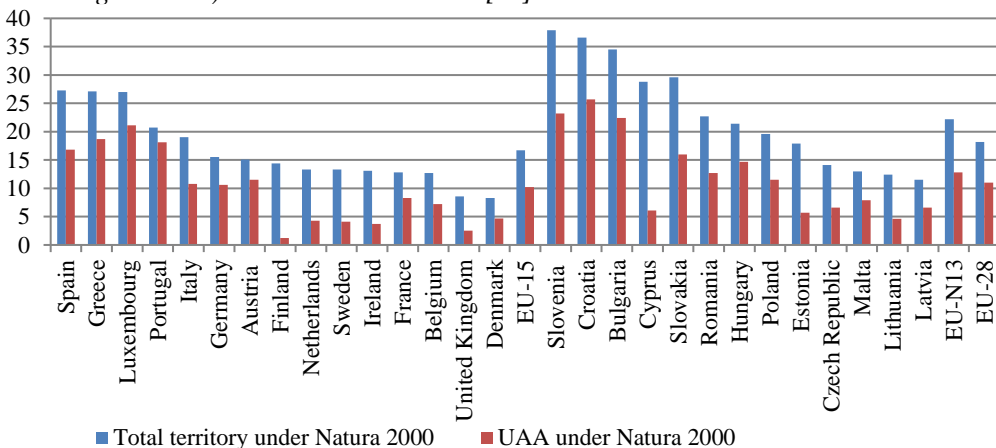
4. Protect Valuable Natural Habitats

4.1. The Natura 2000 Network

The entire Natura 2000 network has over 26400 areas covering over 318 thousand km² of sea surface and over 788 thousand km² of land area, which constitutes 18.2% of the area of the European Union countries and about 11% of the agricultural land area. It is therefore a coordinated system of protected areas of unprecedented scale. However, it is worth emphasizing that both the total area of the N2000 network (22.2%) and the agricultural land area covered by this form of protection (12.8%) is greater in the "new countries" (EU13) that joined the EU in 2004 and later than it is in the old countries (EU 15) (16.7% and 10.2% respectively).

The share of the area covered by this form of protection is varied within individual countries. In Slovenia, Croatia and Bulgaria over 1/3 of the area is protected under the N2000 network. In these countries, the largest percentage of arable land is also covered by this form of protection (Croatia - 25.7%, Slovenia - 23.2%, Bulgaria - 22.4%). Among the EU15 countries, the largest percentage of agricultural land protected under the N2000 network is in Luxembourg (21.1%), Greece (18.7%) and Portugal (18.1%). Poland, in terms of the percentage share of the total area covered by the N2000 network, ranks 8th among 13 new countries and is on the 12th position in the ranking of all EU countries. With regard to the percentage share of arable lands covered by this form of protection, Poland ranks 7th and 12th respectively (ex aequo with Austria) (**Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.**). However, the effectiveness of the protection of agricultural habitats under the N2000 network depends not so much on the area of arable lands covered by this form of protection, but on the proper delimitation of protected areas and the scope of protective measures taken by farmers.

Figure 2. Total territory under Natura 2000 and UAA (Agricultural Area including natural grassland) under N2000 in 2016 [%]



Source: https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2017_en.pdf

4.2. Subsidizing Pro-Environmental Activities in N2000 Areas in Poland

Under the financial support system for farms located in N2000 areas in Poland, funding can be obtained for investments that will not have a negative impact on the protection objectives of the N2000 area and are not inconsistent with the mandatory protection measures established for that area. Under the RDP (Rural Development Programme) 2007-2013, the level of eligible costs reimbursement (60%) increased by 10 percentage points in investment projects. In turn, RDP 2014-2020 introduced a separate priority supporting only investments in N2000 areas.

The standard amount of funding in this priority amounts to 50% of the investment costs, young farmers can get a higher level of support (60%). During the implementation to (September 2017 – May 2019), 2,194 applications were submitted in N2000 areas in Poland, of which 1,482 were signed. At the same time in the remaining area 18,354 investment agreements were signed out of the submitted 58,123 applications. According to the data of the ARMA Management Information System, 68.3% of investment applications submitted in the N2000 areas and 31.6% of investment applications in the remaining area received funding, and thus the chance of obtaining investment funding for farms in the N2000 areas is noticeably higher.

Farmers undertaking environmental commitments under the agri-environmental nature program (protection of endangered bird species and natural habitats) in the N2000 areas in 2004-2013 received higher financial support than farmers who implemented this package outside of the N2000 areas. In the RDP 2014-2020, the amount of financial support for the protection of natural habitats is not diversified, and the support for the protection of breeding habitats and extensive use in Special Protection Areas (SPAs) has been limited exclusively to N2000 areas.

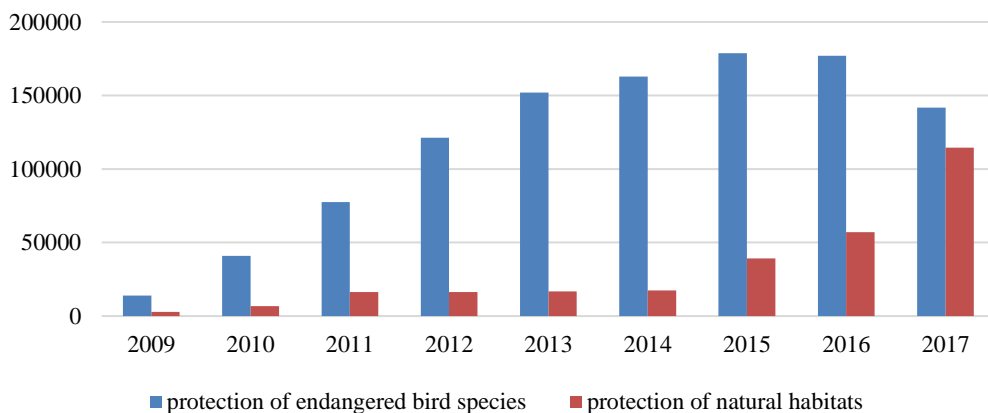
In Poland, support under the agri-environment-climate measure is granted on the same terms to both new beneficiaries and those who have been implementing the program for many years.

On the other hand, in organic farming, financial support is higher during the conversion period (the first 2 years), i.e. changing the farm into an organic system. In the remaining period, financial support is lower and independent of the period of running the farm in this type of production system. Since in Poland in the years 2013-2016 there was a decrease in both the number of organic farms and the area of organic agricultural land, it is worth considering the possibility of introducing a reward system for the persistence in the implementation of agri-environmental commitments (e.g. over 10 years + 10%, over 20 years + 20% etc.) especially on naturally valuable agricultural lands.

In the years 2007-2013, EUR 460 million was reserved for the implementation of the nature package in the N2000 in Poland which was supposed to provide active protection for a total of 378 thousand ha of permanent grassland. According to ARMA data, only 174.7 thousand ha were covered by protection throughout the entire RDP 2007-2013 period which constitutes only approximately 46.2% of the planned area. Therefore, significant changes were introduced in the next RDP programming period 2014-2020. The amount of financial support for the protection of individual bird species has been diversified and the amount of support for some types of habitats has been corrected (e.g. increased payments for the implementation of the semi-natural fresh meadow option by about 30%).

The summarized ARMA data set (Figure 1) shows that since 2015 there has been a decrease in the area of habitats in the N2000, on which farmers implement protective measures as part of the protection of breeding habitats of endangered bird species. On the other hand, the area of habitats is growing, where farmers take measures to protect valuable natural habitats in the N2000 areas, only in 2014-2017 this area increased more than six times.

Figure 1. Agricultural land area protected as part of the nature package in N2000 areas in Poland in 2009-2017 [ha].



Source: Own work based on results of the ARMA Management Information System data.

5. Empirical Results

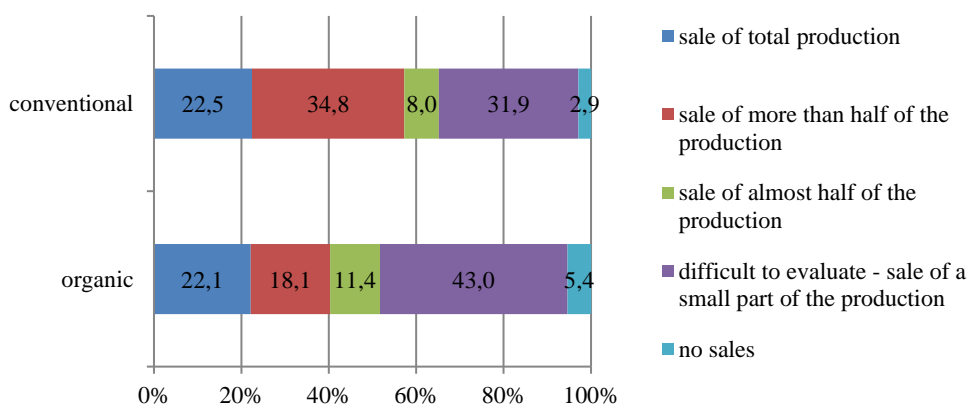
The farms covered by the research, regardless of the agricultural production system (organic, conventional), were family farms, handed down between generations. Over 90% of all respondents inherited farms. Only 7.2% of owners of organic and 10.7% conventional farms came into possession of a farm through purchase. It is also worth emphasizing that about 90% of all respondents own farms for more than 15 years. This means that the respondents were also the owners of these farms before Poland's accession to the EU, and before this area was even included in the N2000 network. In

the context of conservation measures of the N2000 area, this is a favorable situation, since land is sporadically subject to market trading, and the continuity of agricultural use contributes to the preservation of the biological biodiversity of these areas.

The researched farms located in the area of the N2000 "Biebrza Valley" PLH200008 are diversified in terms of agrarian structure, organization of agricultural production and market connections. The average area of organic farms in this area was - 22.4 ha (min. 3.81 ha, max. 193 ha), while organic farms in the region (Podlaskie Voivodeship) – 17.3 ha, in Poland – 25.2 ha. In turn, the average area of conventional farms surveyed is – 25 ha (min. 5 ha, max. 115 ha), respectively, for the region – 12.4 ha, for Poland – 10.8 ha. Since the production potential of agricultural holdings is largely determined by the utilized agricultural area, the organization of agricultural production is of great importance.

Livestock production was carried out by 92.8% of conventional farms and only 37.5% of organic farms, with cattle rearing dominating regardless of the production system (conventional, organic). Analyzing the marketability of these farms, it can be stated that as much as 48.4% of organic farms and 34.8% of conventional farms do not produce for the market. These farms do not sell agricultural produce or occasionally sell small quantities (*Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.*), and thus they mainly depend on agricultural subsidies and possibly additional (non-agricultural) sources of income.

Figure 4. The degree of relation between the farm and the market depending on the agricultural production system (organic, conventional) (% of sales)



Source: Own research.

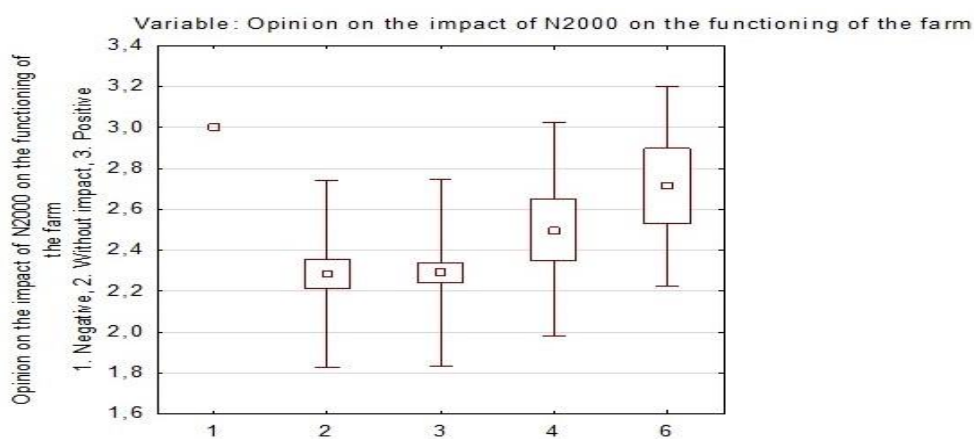
Farmers were asked in the surveys whether and to what extent the location of a farm in N2000 areas affects its functioning and financial result. The conducted Chi-square test showed no significant differences in the opinions of conventional and organic farm owners on the impact of the N2000 area on the functioning of the farm and its financial results (Table 1).

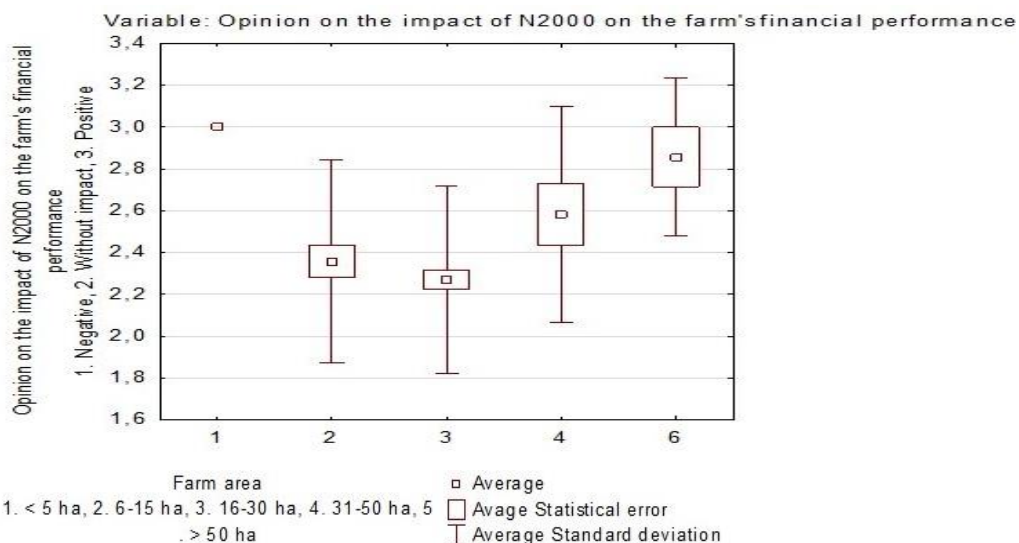
Table 1. Summary statistics for Chi-square tests on the functioning and financial condition of farms under N2000

Statistic	χ^2	df (degrees of freedom)	p-value
Positive impact of N2000 on the farm	0.019	1	0.891
Negative impact of N2000 on the farm	2.955	1	0.086
No impact of N2000 on the farm	0.421	1	0.517
Positive impact of N2000 on the financial condition of the farm	0.389	1	0.533
Negative impact of N2000 on the financial condition of the farm	1.474	1	0.225
No impact of N2000 on the financial condition of the farm	0.045	1	0.833

Source: Own research.

In turn, the analysis of rank variance showed a significant impact of organic farm area on the opinions of their owners regarding the impact of the N2000 area on the functioning and financial results of farms (Figure 2).

Figure 2. Opinions of organic farmers on the impact of the N2000 network on the functioning of farms and financial results depending on the area of farms.



Source: Own research.

The research results showed that along with the increase of the owned arable land, the conviction of the organic farmers covered by the research about the positive impact of the protected area on their activity increased. This is related to the subsidy system for organic farming under the CAP. Financial support is related to the area of organic farming. Research shows that this support was granted to the following crops:

- certified agricultural crops (64.4% of farmers – average crop area 9.8 ha);
- permanent grassland (57.2% – 12.8 ha, respectively);
- vegetables (9.2% – 1.2 ha);
- orchards (25% – 1.2 ha).

In the case of conventional farms, the analysis of rank variance did not show a significant impact of arable land on the farmers' opinion on the impact of the N2000 area on the farm and its financial results, although about 50% of the surveyed farmers who operated farms in a conventional system implemented the sustainable agriculture package, i.e. they also received additional financial support, but at a much lower level and only for arable land.

Regardless of the production system (conventional, ecological), farmers made commitments under the agri-environmental nature package program (Valuable habitats and endangered bird species in N2000 areas). 40.8% of organic farm owners (the average area covered by support is less than 15 ha) and 27.4% of conventional farm owners (the average area was about half smaller and amounted to 7.2 ha) made commitments in this regard.

The research results showed that the age and education of the respondents did not affect the functioning and financial results of their farms. The conducted Chi-square

test showed significant differences between owners of conventional and organic farms only in the case of secondary education (Table 2).

Table 2. Summary statistics for Chi-square test on the education level of farm owners.

Statistic	χ^2	df (degrees of freedom)	p-value
Higher education	0.182	1	0.670
Secondary education	4.792	1	0.029
Vocational education	3.026	1	0.082
Primary / lower secondary education	0.200	1	0.654

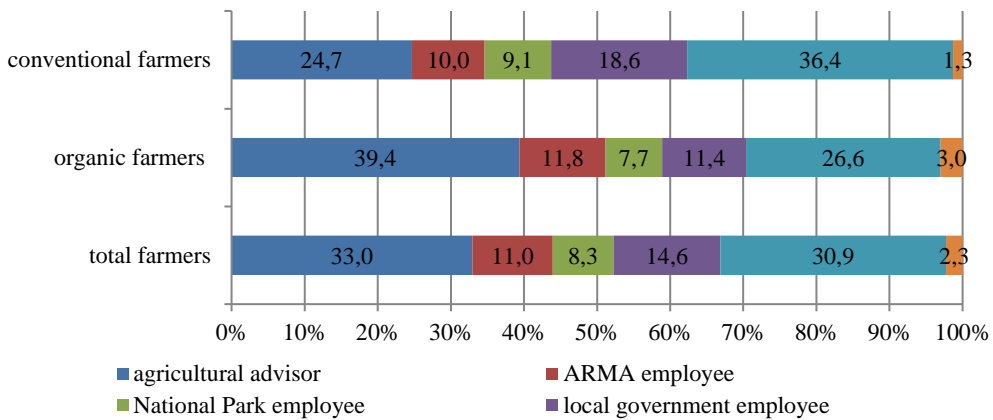
Source: Own research.

The research shows that only farmers running conventional farms were interested in obtaining investment support. Importantly, every fourth surveyed farmer received support in this regard. Organic farmers mainly benefited from non-investment support, i.e. financial support for organic farming.

The research hypothesis presented in the paper assumes that the scope of pro-environmental projects undertaken in the areas of N2000 depends, among others from substantive support of advisory institutions and quality of human capital (farmers). In this context the quality of human capital was not only analyzed as a resource of formal knowledge (8.6% – higher education, 52.7% – secondary, 29.5% vocational, 9.2% – primary education), but primarily as the assessment of attitudes, opinions, habits and the resulting behaviors.

This hypothesis was adopted assuming that covering the area with the N2000 protection program, using economic (under the CAP) and educational incentives, will increase the ecological awareness of farmers. Research shows that a small percentage of farmers (around 13%) participated in both public consultations related to the creation of the N2000 area and educational meetings on the subject of N2000. Farmers most often pointed to the lack of information about meeting dates (38.4%) and lack of time (35.3%). Their knowledge about N2000 came mainly from agricultural and/or agri-environmental advisors (33.0%) and media coverage (30.9%). It is worth emphasizing that for organic farmers the most important source of knowledge and information were agricultural advisors (39.4%), who encouraged them to make agri-environmental commitments. Conventional farmers (36.4%) more often indicated the media as a source of information about N2000 (**Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.**).

Figure 6. Opinions of farmers on the sources of knowledge and information about N2000



Source: Own research.

A key issue in the process of implementing active environmental protection programs on naturally valuable agricultural land (stimulating measures) is therefore an efficient system of information and informal education. It is not so much about providing detailed information about the principles of the conservation program as it is about establishing direct contact with farmers (e.g. during individual advisory meetings, by phone, e-mail or by mail – using available databases of institutions related to agriculture).

An important issue is encouraging participation in organized information meetings and ensuring local communities that their voice is extremely important, according to the principle of "nothing about us – without us".

6. Conclusions

Polish experience regarding the implementation of conservation measures on valuable agricultural land (N2000) allows to state that environmental policy in this respect should be based on the idea of socially sustainable agriculture, including:

- ecological sustainability (proper delimitation of areas predestined for protection, their environmental valorization, development of conservation measures and their implementation);
- economic sustainability (the system of agricultural subsidies and/or other solutions to meet the basic living needs of farmers and their families);
- social sustainability (effective inclusion of local communities in information, education and decision-making processes at the stages of development, deployment and implementation of protection programs).

The specificity of this form of nature protection consists in supporting extensive agriculture in valuable natural habitats, which owe their origin and protection to

environmentally friendly farming systems. These habitats can be threatened by both intensifying agriculture and giving up farming practices. Of course, the question arises whether the system of subsidizing agriculture, including pro-environmental measures under the EU CAP and the N2000 network effectively protect naturally valuable habitats used for agriculture.

The conducted analyses show that changing the access criteria and / or the amount of financial support affects the area of protected habitats within the framework of the N2000 nature package. This proves the large dependence of protective measures taken by farmers on financial support. In the authors' opinion, the introduction of financial bonuses for farmers for continuing conservation activities in valuable natural habitats, strengthening educational activities and introducing non-financial gratification will contribute to building new human-nature relations, beneficial for all parties.

It is a proposal that gives the chance to build lasting relationships that will survive in the event of limiting the amount of financial support and / or its abandonment and, for example, a transition to other non-financial protection instruments. According to the authors, delighted with the natural richness of the area covered by the research of the N2000 "Biebrza Valley " PLH200008 area, issues related to the need to implement conservation measures remain beyond any discussion. However, opportunities should be sought to improve the effectiveness of these activities in the ecological, economic and social dimensions.

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