

PROVISION OF PUBLIC GOODS BY AGRICULTURE IN POLAND

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Abstract. The concept of public goods connected with agriculture and environment gains more and more attention of societies. It is taken into consideration by the environmental, rural and agricultural policies as well. The aim of the paper is to examine the dimensions and the particular features of the provision of the public goods by agriculture and to demonstrate the involvement of the Polish agriculture in supply of such goods. The analyses showed that the concept of public goods in agriculture evolved from externality oriented approach to very board holistic approach. The provision of public goods is strongly supported as a part of the Common Agricultural Policy. The interest of the Polish farmers in provision of public goods is quite high. About 50% of famers got subsidies due to different measures connected with this activity.

Key words: public goods, agriculture, externalities, farmers, support

JEL code: H4, Q1, Q5

Introduction

Agriculture naturally linked with the nature is not longer seen only as a provider of food that is a good essential for human existence but as an important producer of many other kinds of goods which become important and desirable for modern societies. Among them, **the so-called** public goods deserve a special attention. The concept of public goods connected with the agriculture and environment develops gradually and influences noticeably the shape and scope of environmental, rural and agricultural policies. The significance of agricultural public goods is used to justify the support for agriculture as a sector of the economy.

The aim of the paper is to examine the dimensions and the particular features of the provision of the public goods by agriculture and to show the involvement of the Polish agriculture in supply of such goods.

In the paper the following questions were raised: (i) what is the scope of public goods connected with agriculture, (ii) what is the nature of public goods provided by agriculture, (iii) what is the scope of the provision of agricultural public goods by the Polish farmers.

The paper starts with the discussion on the origins and definitions of the public goods,

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next the characteristics of agricultural public goods is presented. It is followed by analysis of the provision of public goods by the Polish agriculture.

Materials and methods

There are several sources of materials used in the paper. The theory is based on scientific literature on public goods and other relevant problems. The empirical data for the examination of the Polish experiences were taken from the Reports of Agency of Restructuring and Modernization of Agriculture which is responsible for the distribution of subsidies under the frame of the Common Agricultural Policy (CAP) in Poland.

The study of literature and descriptive method supported by simple statistical analyses of data are the main methods used in the article.

Research results and discussion

Public goods – theoretical background

The concept of public goods originates from two well-known papers published by Samuelson in 1954 and 1955 (Samuelson, 1954, 1955). However, as Samuelson indicated, some economists who did not neglect the problem of the theory of optimal public expenditure - E. Sax, K. Wicksell, E. Lindahl, R. Musgrave, H. Bowen could be treated as precursors of the concept*. Samuelson distinguished two types of goods: private goods and public goods†. Private consumption good can be parcelled out among individuals and total consumption of particular j-good is the sum of individual consumptions‡. In the case of public good, each individual's consumption of such a good does not lead to subtraction from any other individual's consumption of that good so the individual consumption of any consumer equals total consumption§. Defined in such way, the goods are extreme polar cases. The rivalry in consumption is the criterion of division. The papers drew great attention and caused discussion among scholars. The participants undertook problems of such aspects as congestion or excludability from consumption. In result, many different classifications of goods were recommended**. The classification joining two criteria: rivalry in consumption and excludability became very popular. The result of the combination of these two criteria is shown in Table 1.

Public goods are those goods which simultaneously perform conditions of non-rivalry and non-excludability. In real world not many goods have such characteristics so different authors propose using different degrees of rivalry, excludability and congestion. Such solution was used by Cooper et al. (2009). In their study they distinguished three kinds of rivalry (rival,

* The first three were named by R. Musgrave as Voluntary Exchange Theorists (Dougherty, 2003).

† The term of public goods was introduced in the second paper in the first Samuelson used the term "collective consumption goods"

‡ $X_j = \sum_{i=1}^n X_j^i$ where X_j -the total consumption of j-good, X_j^1, \dots, X_j^n individual consumers of j-good

§ $x_j = x_j^i$ and $x_j = x_j^i$ and $x_j = x_j^i$

** See: Davis O.A., Whinston A. B (1967), A. Randall (1983), E. Romstad (2002), Cooper T., Hart K., Baldock D. (2009)

non-rival for a small user group, non-rival), three kinds of excludability (excludable, excludable only at high costs, non-excludable) and different levels of congestion risk (small group, congestion as the number of users increases, certain degree of congestion, high risk of congestion). As a result, they got three groups of goods according to the degree of publicness: with low, medium and high degree of publicness. The last group includes two groups of public goods: pure public goods and impure public goods. In both cases, there is no rivalry in consumption but different kinds of excludability and susceptibility for congestion take places. Although, it is a very valuable characteristics, it misses commons which are characterised by no excludability* and rivalry in consumption.

Table 1

The classification of goods by excludability and rivalry in consumption

		Excludability	
		YES	NO
Rivalry in consumption	YES	Private goods (<i>bread</i>)	Commons (<i>see shore, fishes in ocean</i>)
	NO	Club goods (<i>cinema, swimming pool</i>)	Public goods (<i>national defence</i>)

Source: Jakubowski, M. (2012). Dobra publiczne i dobra wspolne (Public Goods and Commons). In: Wilkin, J. (ed.). Teoria wyboru publicznego: glowne nurty i zastosowania (Public Choice Theory: Mainstreams and Applications). Wydawnictwo Naukowe SCHOLAR. Warsaw

Public goods are considered as market failure because the market cannot resolve the problem of their optimal provision as no competitive market pricing mechanism for such goods exists. When individual consumption equals total consumption there is no incentive for each consumer to reveal his/her preferences for public goods consumption and even "it is in the selfish interest of each person to give false signals to pretend to have less interest in a given collective consumption activity than he really has" (Samuelson, 1954). The inclusion of the excludability criterion makes the problem more complex.

Agriculture as a source of public goods

The concept of agricultural public goods underlines importance of agricultural goods for human wellbeing and connections of agriculture with the environment. As Heal and Small (2002) note, agriculture is the most important of the activities through which humanity interacts with the natural world; farming's impact on the global environment is greatly disproportional to its share in the total economic activity. The list of agricultural and environmental public goods in literature is long and not fixed. This phenomenon can be connected with the approaches to multifunctional agriculture (Vanni, 2014). The supply-side approach considers agricultural public goods as by-products stemmed from the phenomenon of multiple joint outputs of a typical agricultural activity or of a combination of activities. The "non-intentional" output can be positive (public goods as positive externality) and negative (public bads as negative externality). The demand-side approach focuses on society demand

* Unless eligible agents do not resolve this problem

on different goods and services, which agriculture can provide. In this concept many aspects of agricultural production, its characteristics and specific features are regarded as required, useful, valuable. The third approach (holistic) goes further pointing out that the multifunctional agriculture is a consequence of the changing needs and demands of consumers and society (Van Huylenbroeck et al., 2007).

Short review of the lists of public goods considered by different authors shows the prevalence of the last approach. In 2002, in the **FAO's publication "The State of Food and Agriculture"** the following environmental public goods (essential from global perspective*) were discussed: ecosystem stability, biodiversity, wildlife, reduction of greenhouse gas emission from forest fires, carbon sequestration, protection of water bodies, hydrological stability. Several years later, Cooper et al. (2009) examined such public goods as agricultural landscapes, water quality and water availability, soil functionality, air quality, resilience to flooding, resilience to fire, rural vitality, food security, farm animal welfare and animal health and Jürgen Fröhling (2007) included recreational value of the countryside, jobs and employment in rural areas, sufficient feed, renewable resources and bio energy. The above mentioned list of public goods shows that such goods can take a variety of forms: physical goods like renewable resources, required features of goods like air quality, services like resiliencies to fire, ethic value like animal welfare or even culture value like rural vitality. It seems that nearly every positive phenomenon in agriculture, rural development or environment can be called a "public good". Such a broad attitude results a great ambiguity. Nearly each presented public goods encompasses a collection of different goods and values of a very subjective character. Moreover, it is worth to mention that unlike the supply side approach in which negative externalities (sometimes called "**public bads**") are considered and discussed, the two other approaches focus on positive public goods as demanded by the society. It can lead to the **undermining and neglecting the importance of "public bads"** connected to agricultural production or to multiplication of expectations and requirements from farmers conducting an agricultural activity.

A search for justification of governmental or the EU intervention involving great subsidies for agriculture and rural areas is one of the main sources of such a vast range of agricultural public goods. This problem can be examined from the perspective of rent-seeking theory[†] or theory of the groups[‡].

The provision of public goods in Poland

The concept of agricultural and rural public goods has gained more and more attention in Poland within last years. The impact on the rise of such interest in that issue was given by **the Poland's accession** to the European Union followed by the Common Agricultural Policy. It is

* The goods have regional and local dimension too

† G. Tullock and A. Krueger are prominent representatives of that theory.

‡ See M. Olson *The Logic of Collective Action: Public Goods and the Theory of Groups* Harvard University Press. 1971

difficult to point any scientific publications on this problem till late 90's of the 20th century. Some economic scientific papers on relations between environment and agriculture were published only in 1998, 1999* but there were no analyses from the perspective of market failures. It does not mean that some important problems as biodiversity or water pollution by fertilisers (positive and negative externalities) were not recognised and neglected in Poland. Generally, they were examined by researchers directly connected to the particular problem but not by the agricultural economists. Certain law regulations against particularly negative externalities of agricultural production existed too. But the awareness of the problem from economic perspective was rather low.

With the accession to the EU the provision of public goods became one of required activities of agriculture and has gained the financial support. What is more, the support encompassed the decrease in production of negative externalities (public bads), as well.

In financial perspective 2004-2006, measures aimed at provision of public goods by farmers were offered in the frame of Rural Development Plan (RDP[†]) 2004-2006 and Sectoral Operational Programme (SOP) Restructuring and Modernisation of the Food Sector and Rural Development 2004-2006. Under the RDP 2004-2006 two measures were aimed to encourage farmers to provide public goods: Measure 4 **"Support for Agri-environment and Animal Welfare"** and Measure 5 **"Afforestation of Agricultural Land"**. Part of funds under the SOP was directed for decreasing negative externalities of agricultural production like solid waste (production of fuel from biomass such as hay, meadow and wood waste etc., within **measure: "Diversification of agricultural activities and activities close to agriculture to provide multiple activities or alternative incomes"**), **waste water (measure: "Development and improvement of the infrastructure related to agriculture"**), animal waste (measure: **"Investment in agricultural holdings"**).

Steady development of the concept of agricultural and environmental public goods from supply-side approach towards holistic approach was fully reflected in the next financial perspective (2007-2013) in the form of much longer list of measures connected to the problem of public goods by agriculture. Two differences between that and previous perspective were of general character. First, the number of measures related to the provision of public goods by agriculture increased noticeably. Second, the measures focused generally on provision of the public goods not only in the form of positive externalities but new services (non-tradable goods) as well while the reduction of agricultural public bads gained relatively much less attention. Two out of four axes of the RDP 2007-2013: Axis 2: Improvement of the environment and the countryside and Axis 3 Quality of life in rural areas and diversification of rural economy were explicitly connected with the environment, countryside, quality of life in rural areas and diversification of rural economy as well as with general support for the provision of vast range of positive public goods. Axis 2 encompassed four measures: **"Support of management in mountain areas and in less-favoured areas (LFA)"**, **"Agri-environmental programme"**, **"Afforestation of agricultural and non-agricultural land"**, **"Restoring forestry**

* The list of such publications encompasses publication of Institute of Agricultural and Food Economics: W. Michna **"Program of pro ecological development of the country, agriculture and food economy till 2015. Synthesis, and A. Wos "Tools of Environment Policy in the Process of Restructuring and Modernisation of Agriculture"** (Zegar, 2002)

[†] In Poland, PROW is the acronym of the name of this program.

production potential damaged by natural disasters and introducing appropriate prevention instruments". Axis 3 involved such measures like: "Diversification into non-agricultural activities", "Establishment and development of micro-enterprises", "Basic services for the economy and rural population", "Village renewal and development". Of course, not all measures in every axes could support farmers' activity, some of them were offered to rural communities or other agents in rural areas (RDP 2007-2013).

Moreover, in Axis 1, the measure "Modernisation of agricultural holdings investment" was directed to diminish public bads as it supported investments which contributed to improvement in holdings as far as environmental protection or animal welfare was concerned.

Results of the support

The result of the support can be estimated by the number of measure participants and value of the support. In some cases other indicators are available, for example, in the case of afforestation the number of hectares of afforested land.

Table 2

The number of participants and value of subsidies under measures supporting farmers' provision of positive public goods and reduction of public bads

Programme	Measure	Number of Participants	Support value (mln PLN) ³	Remarks
2004-2006				
RDP	Measure 4. "Support for Agri-environment and Animal Welfare" ¹	79 867	approximately 3 000.0	
	Measure 5. "Afforestation of Agricultural Land" ¹	9 006 (new applications)	385	
SOP	Priority I: measure: "Investment in agricultural holdings"	24 231	2 209	(only 4% of investment were connected to environment)
	Priority II: measure: "Diversification of agricultural activities and activities close to agriculture to provide multiple activities or alternative incomes"	4 108	279	(2 075 new places of job connected to handicrafts and craftsmanship or agro tourism)
	Priority II: measure: "Development and improvement of the infrastructure related to agriculture"	3 394	146	967 sewage treatments (37% of investment were connected to wastes of water and energy)
2007-2013				
RDP ²	Axis 1. Measure "Modernisation of agricultural holdings investment"	60 212	8 495	only 9% applications were not for movable machines
	Axis 2. "Improvement of the environment and the countryside"			
	Measure: "Agri-environmental programme"	126 866	4 590	
	Measure: "Afforestation of agricultural and non-agricultural land"	13 825	271	72 600 ha of new forest
	Axis III. "Quality of life in rural areas and diversification of rural economy" Measure: "Diversification into non-agricultural activities"	15 369	1 357	only 8.2% of applications were connected to handicrafts and craftsmanship or agro tourism

¹ the measure was continued in financial perspective 2007-2013. Year of 2011 was the last year in which farmers could apply for support under this measure

² data at the end 2013

³ the value of agreements

Source: author's calculations based on data Annual Reports on Activity of the ARMA (2008 - 2013), ARMA 2007-2014

Data in Table 2 show that environmental measures were very popular among farmers. During two financial perspectives approximately 200 thousand of farmers participated in these measures. In financial perspective 2004-2006 the package "Soil and water protection" was the most popular (ARMA, 2008). Its share in the total support value equals 50%. The least interest was in package "Maintenance of extensive pastures". In the RDP 2007-2013, package "Organic

farming” was on the first place, whereas, “Buffer zone” on the last^{*}. What is remarkable, the package “Sustainable farming” (with the share 1,5%) was rather unpopular in the RDP 2004-2006, however, in the next perspective it gained farmers’ attention and its share in support exceeded 20%. It is necessary to add that in both financial perspectives measure “Support for less-favoured areas (LFA)”[†] was available. Every year, 600 – 700 thousand farms got subsidies of total value approximately EUR 300 million (ARMA, 2014).

The measure “Afforestation of agricultural and non-agricultural land” attracted nearly 23 000 participants; within this measure 76 000 ha of forest was planted (ARMA, 2014).

Other measures had only a very small contribution to provision of public goods. For example, in the SOP 2004-2006 only 4% of investments supported under the measure “Investment in agricultural holdings” were connected with environment and in the similar measure in the RDP 2007-2013 (“Modernisation of agricultural holdings investment”) merely 1% of investment were used for improvement of soil quality while 91% were used for movable machines (ARMA, 2014).

The great support for provision of agricultural public goods is continued in financial perspective 2014-2020. In the RDP for that period two out of six priorities are connected strictly to environment protection. They are: “Restoring, preserving and enhancing ecosystems related to agriculture and forestry” and “Promoting resource efficiency and supporting the shift toward a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors” (European Commission, 2013). The particular measures will start operating in 2015.

Conclusions

From its nature, agriculture is connected with environment and generates positive and negative effects for it. The concept of public goods in agriculture has been evolving from supply oriented approach to holistic approach. As a result, the number of “public goods” recognised is steadily growing and the list of such goods encompasses not only strict environmental goods but social, ethical cultural values and climate phenomena. The public goods as one of the market failures justify the support for agriculture. As the scope of the term has been broadening steadily, the scope and value of support has increased.

The interest of the Polish farmers in provision of public goods has been quite high mainly due to subsidies. Approximately 50% of them got subsidies. Farmers learn very quickly how to apply for the support. Some ideas like sustainable and multifunctional agriculture develop gradually and gain more and more farmers’ attention. So one can conclude that low interest in particular measure in one perspective does not mean low interest in next perspective because farmers and other agents should have time to get used to new ideas or phenomena and adapt to them.

^{*} It stemmed from the scope of the package and low level of support (PROW 2007-2013, 2014)

[†] the measure is to prevent depopulation of LFA and losing their agricultural character, economic and environmental effects (Rural Development Programme for 2007-2013, 2007).

The outcomes of the support are undoubtedly positive but the question arises, if farmers adjust their behaviours only to get subsidies or if they become gradually convinced of the significance of public goods that they provide.

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