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Investment Outlays on the Development of the Collective Sewage System of the Village - Selected Problems

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Abstract. The article presents changes in investment outlays in environmental protection, with particular focus on investment outlays incurred on the sewage system of rural areas in Poland in years 2012-2016. The analysis of changes in these investment outlays according to investment directions (such directions as: collective water supply, collective sewerage, collective sewage treatment plants, individual rural sewage treatment plants, landfills) and sources of financing (from the state budget, local governments, rural residents, funds environmental protection and water management, structural funds of the European Union, others, for example EcoFund). The research covered the structure of investment outlays on the sewage system of the village both nationally and in the voivodeship section. The importance of EU structural funds for improving the sanitary condition of the village was emphasized. The most important effects of investment outlays in the development of water supply and sewage networks were presented, including: the increase in the length of collective water and sewage systems, increase in the number of sewage connections to residential and commercial buildings and improvement of the unfavorable relation of the collective length of the water supply network to the length of the sewage system.

Keywords: Investment Outlays, Collective Sewage System, Polish Countryside.

1 Introduction

The sewerage network is an important element of the technical infrastructure that affects the state of the natural environment. The developed sewage network and associated with such devices and technical infrastructure facilities, such as: water supply network and sewage treatment plants - affect the improvement of the standard of living of inhabitants of rural areas.

Equipping the village with technical infrastructure, including a collective sewerage network, should stimulate multifunctional agricultural development and sustainable development of rural areas [2, 5, 7, 9].

Underdevelopment of water and wastewater management is recognized as one of the most serious barriers to rural development in the European Union. For many years, the Polish village was underinvested in technical infrastructure, including a sewerage system. Quite often, the water supply network functioned without a sewage system. The septic tanks for collecting sewage (septic tanks) were in a great part in poor technical condition [3, 6, 8].

The presence of Poland in the structures of the European Union requires solving the problems of water and sewage management in rural areas (Water Framework Directive). In particular, European Union Structural Funds serve this purpose [1, 5].

However, using their resources requires own contribution. In the case of communes with relatively small budgets, capital-intensive investments are forfeited, for example the development of a sewage system. This is not conducive to the implementation of the idea of sustainable development in rural areas.

The aim of the article is to assess the effects of investment outlays on the development of a collective sewage system in rural areas in Poland in the cross-section of voivodeships.

2 Methods in Data Source

The article uses the method of data analysis with the use of universal statistics. Selected items from the subject literature, specialist studies and general statistics data were used in the preparation of this study, which are published in the statistical yearbooks titled Environmental Protection.

3 Structure of Outlays

Investment outlays on environmental protection and water management include outlays:

- financial or material, the purpose of which is to create new fixed assets or improve (reconstruction, extension, reconstruction, adaptation or modernization) of existing fixed assets,
- as well as outlays on the so-called first investment equipment. These outlays do not increase the value of fixed assets [4].

Investment outlays on the creation of new fixed assets, improvement of existing fixed assets and the first equipment for investments to protect the environment in the Polish countryside in the years 2012-2016 constituted the vast majority of investment outlays, which were allocated for this type of investments for environmental protection and water management in rural areas in Poland (see Fig. 1). On average, 76.4% of the total investment outlays analyzed fell on these outlays annually. Such a division resulted from the need to improve the poor sanitary condition of the village in Poland [7].

In total investment outlays on environmental protection and water management in the Polish countryside during the period under consideration (in the years 2012-2016), one can observe:

- a decrease in the share of investment outlays for environmental protection, to 69.6% (by 11.5 percentage points, respectively);
- increase in the share of investment outlays on water management, up to 30.4% (see Fig. 1).

This phenomenon was influenced by many different factors, one of the most important is the relatively high capital intensity of investments in the field of environmental protection (for example, the development of a sewage system linked to a sewage treatment plant operating on this network).

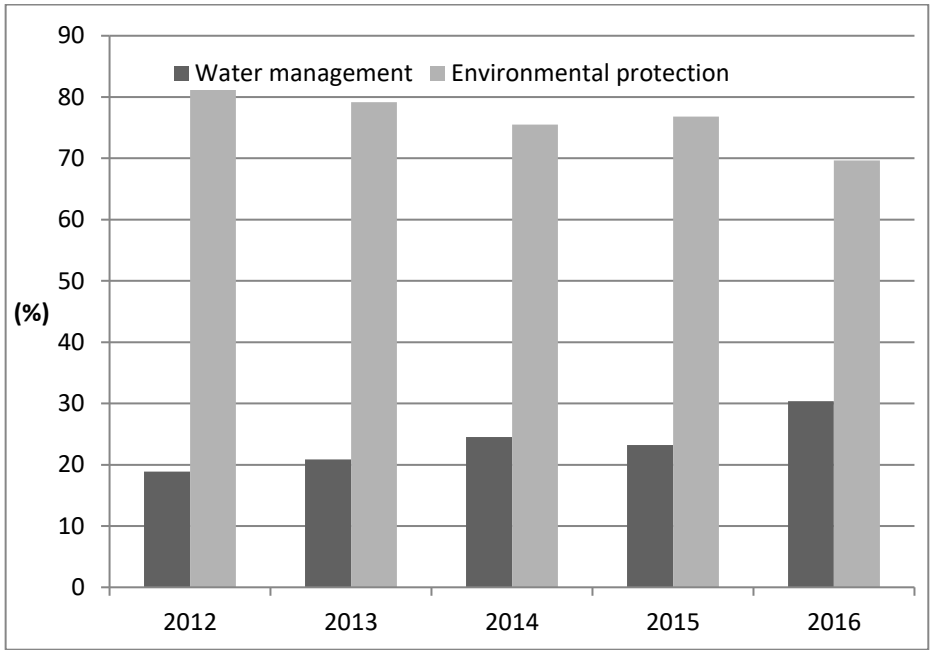

Fig. 1. Structure of investment outlays for environmental protection and water management in rural areas in Poland in the years 2012-2016 (%) [7].

Analyzing the structure of total investment outlays on environmental protection and water management in the Polish countryside in the years 2012-2016, it should be noted that relatively the most were allocated to the development of a collective sewage system (on average 56.4% each year), relatively much for the development of the collective water supply network (23.6% respectively). The smaller share in the total investment expenditures for the creation of new fixed assets, the improvement of existing fixed assets and the first equipment for investments to protect the environment and water management in the Polish village had - in descending order - financing for development: collective sewage treatment plants (13%), individual rural sewage

treatment plants (6.1%) and landfills (0.9%) (see Fig. 2). Such distribution of outlays resulted from the need to alleviate the disproportion between the length of the collective water and sewage network, and ultimately to eliminate differences in this area. Detailed results are presented in the further part of this study.

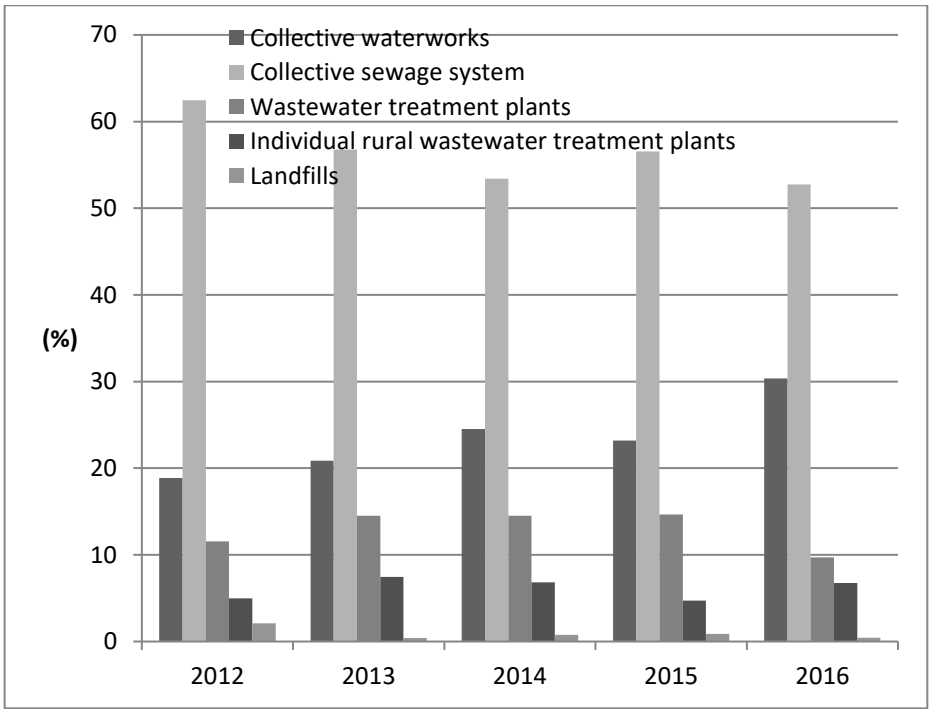

Fig. 2. Structure of investment outlays for environmental protection and water management in rural areas in Poland in 2012-2016 by investment directions (%) [7].

Analyzing investment outlays on the sewerage system in the Polish countryside according to voivodships, it should be noted that in the initial period under consideration, the most were allocated to them in the Śląskie Voivodeship (PLN 435.7 million, it is 18.6% total financial resources), less in voivodeships: Małopolskie Voivodeship (PLN 271.5 million, respectively – 11.6%), Wielkopolskie Voivodeship (PLN 262.5 million, 11.2%), Mazowieckie Voivodeship (PLN 239 million, 10.2%), Dolnośląskie Voivodeship (PLN 185.6 million, 7.9%), Świętokrzyskie Voivodeship (PLN 141.2 million, 6%). The six mentioned voivodeships fell two thirds of all these outlays, the remainder of them (one third of total investment outlays for a combined sewage system in the Polish countryside) has been spread (in the range from PLN 125.1 million to PLN 31.2 million) on 10 provinces. The relatively least-analyzed outlays were incurred in the Lubuskie Voivodeship (PLN 31.2 million, 1.3%) (see Fig. 3).
In the year 2016, compared to the year 2012, the volume of total investment outlays earmarked for the development of a combined sewerage system in the Polish rural area

decreased significantly (to PLN 579 million, about PLN 1763.1 million). An analogous phenomenon occurred in all voivodeships, but with varying intensity (see Fig. 3).

At the end of the period under consideration (in the year 2016) the most investment outlays for the development of collective sewage system in the countryside were allocated in the Wielkopolskie Voivodeship (PLN 113.6 million, i.e. less about 56.7% less than in the year 2012), relatively much in the provinces - in order of descending order: Mazowieckie Voivodeship (PLN 87.6 mln zł, less about 63.4%), Małopolskie Voivodeship (PLN 75.5 million, less about 72.2%), Łódzkie Voivodeship (PLN 54.3 million, less about 36.2%), Dolnośląskie Voivodeship (PLN 49.7 million, less about 73.2%), Śląskie Voivodeship (PLN 43.3 million, less about 90.1%). In the analyzed period (year 2016), the said voivodeships fell two thirds of all these outlays, the remaining part (one third of total investment outlays for a combined sewage system in the Polish countryside) has been spread (in the range from PLN 24.5 million to PLN 4.3 million) on 10 voivodeships. The relatively least-analyzed outlays were incurred in the voivodeship podlaskie (PLN PLN 4.3 million) (see Fig. 3).

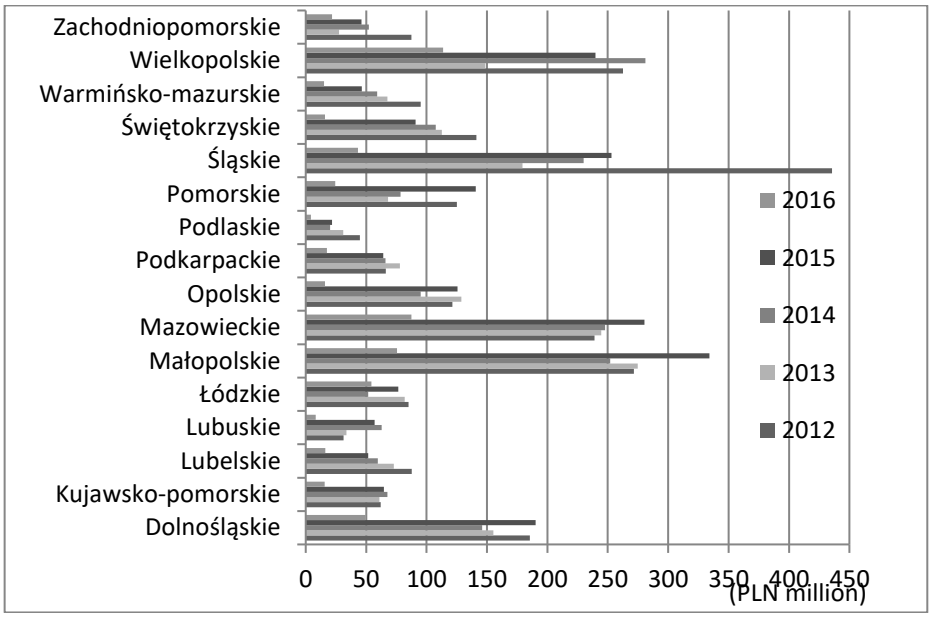

Fig. 3. Investment outlays on the collective sewage system in the countryside in Poland in 2012-2016 by voivodeships (PLN million) [7].

In investment outlays for the development of a collective sewerage network in rural areas in Poland in the years 2012-2016, the largest share was held by funds from structural funds of the European Union (on average per year 35%), only slightly smaller funds of local governments (respectively – 33.3%), funds for environmental protection and water management (18.7%) and other funds had already had a smaller share (9.1%);

this group includes funds from, for example, the EcoFund, Financial Mechanisms or the Swiss-Polish Cooperation Program. Definitely less important in the analyzed area were funds spent by rural residents (on average per year – 3.3%), and especially from the state budget (respectively – 0.6%) (see Fig. 4).

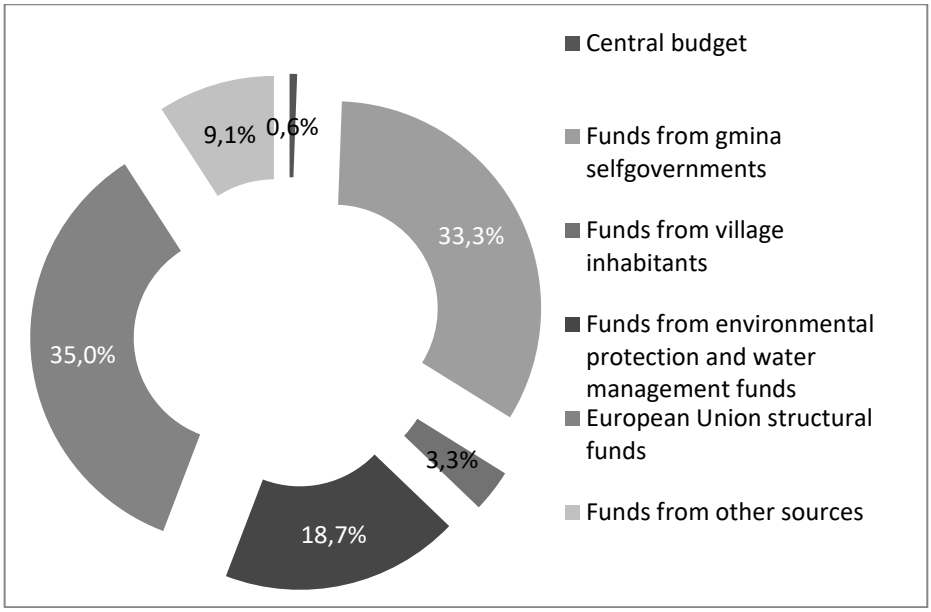

Fig. 4. The average annual structure of outlays for collective sewerage in rural areas in Poland in the years 2012-2016 by sources of financing (%) [7].

4 Material Effects

As a result of capital expenditures incurred on the development of the collective sewerage network in rural areas in Poland, in the years 2012-2016, the total length of this network increased, among others. At the end of the year 2016, it was 94275.9 km and she was longer about 19084.5 km longer than in the year 2012 (see Fig. 5).

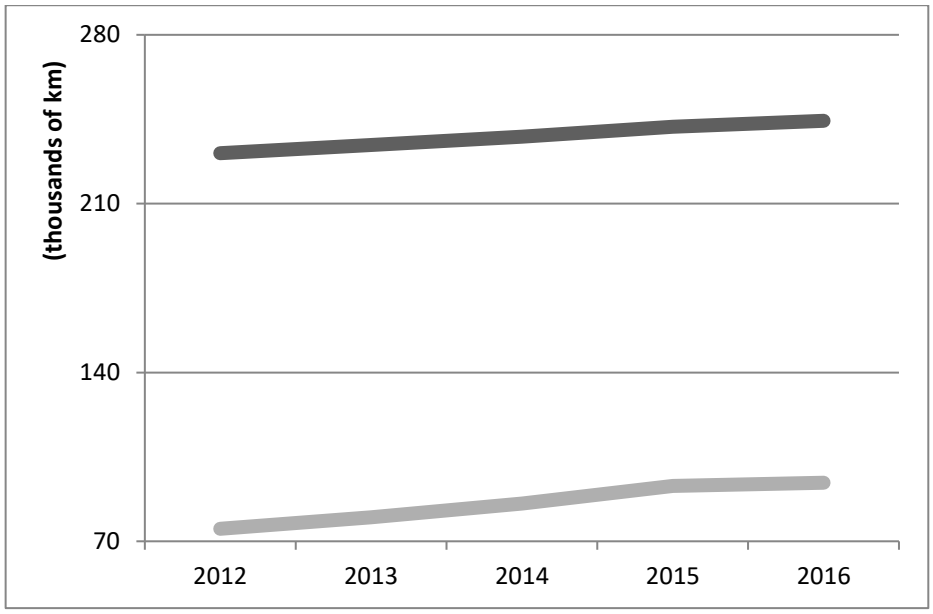

Fig. 5. Length of collective water supply and sewage networks in the whole country in Poland in the years 2012-2016 (thousands of km) [7].

An analogous phenomenon occurred in all voivodeships, but with varying intensity (see Fig. 6). The relatively most dynamic length of the collective sewerage network increased in the villages of the Małopolskie Voivodeship (up to 10905.8 km, this is about 48.16%). In terms of the length of this network, the voivodeship occupied the second place in the ranking of voivodeships in the year 2016 (also in the initial period under consideration). The least dynamic length of the collective sewerage network increased in the year 2016 compared to the year 2012 in the villages of the Zachodniopomorskie Voivodeship (up to 5151.3 km, respectively about 1,87%), what classified the village of this province in the eighth place in the same ranking.

Due to the dynamics of the increase in the collective length of the sewerage network in the countryside (in the year 2016 and in relation to the year 2012), you can rank the voivodships as follows: Zachodniopomorskie Voivodeship (increase abaut 1.87%), Podkarpackie Voivodeship (increase abaut respectively 10.94%), Podlaskie Voivodeship (14.68%), Kujawsko-pomorskie Voivodeship (18.58%), Pomorskie Voivodeship (21.86%), Dolnośląskie Voivodeship (22.82%), Warmińsko-mazurskie Voivodeship (23.80%), Lubuskie Voivodeship (23.94%), Lubelskie Voivodeship (24.83%), Łódzkie Voivodeship (27.33%), Wielkopolskie Voivodeship (28.65%), Świętokrzyskie Voivodeship (29.81%), Śląskie Voivodeship (37.35%), Opolskie Voivodeship (38.73%), Mazowieckie Voivodeship (40.51%), Małopolskie Voivodeship (48.16%) (see Fig. 6).

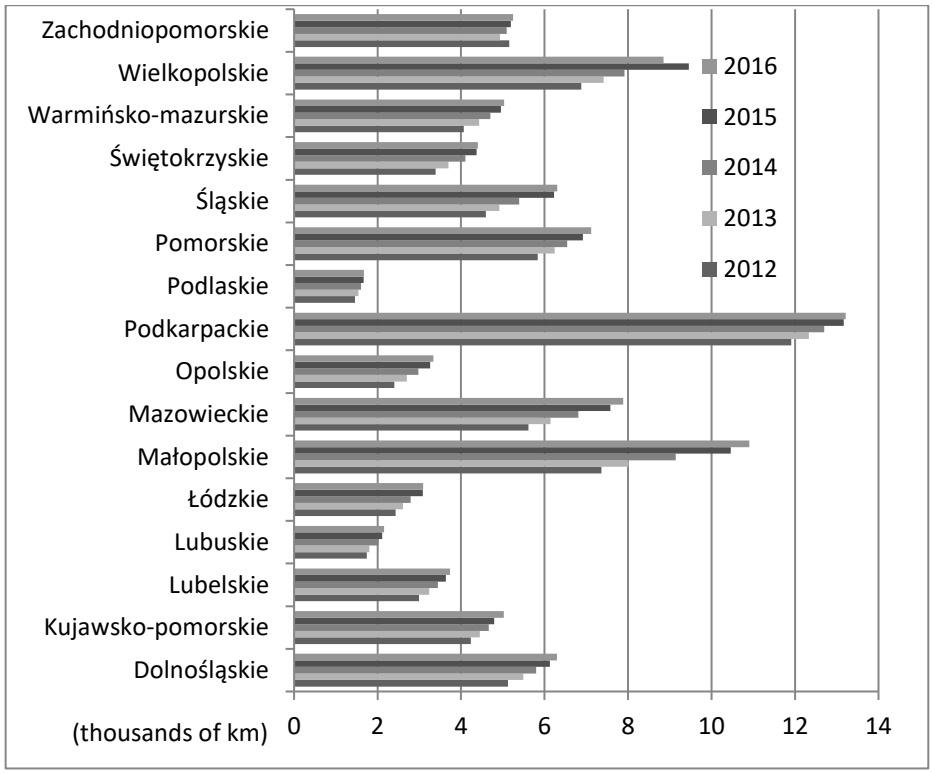

Fig. 6. Length of the collective sewerage network in the countryside in Poland in the years 2012-2016 by voivodeships (thousands of km). [7].

In the corresponding period, the length of the collective water supply network in the villages in Poland also increased 244355.9 km in the year 2016 (about 13434.7 km compared to 2012) (see Fig. 5). An analogous phenomenon occurred in all voivodships, but with varying intensity (see Fig. 7).

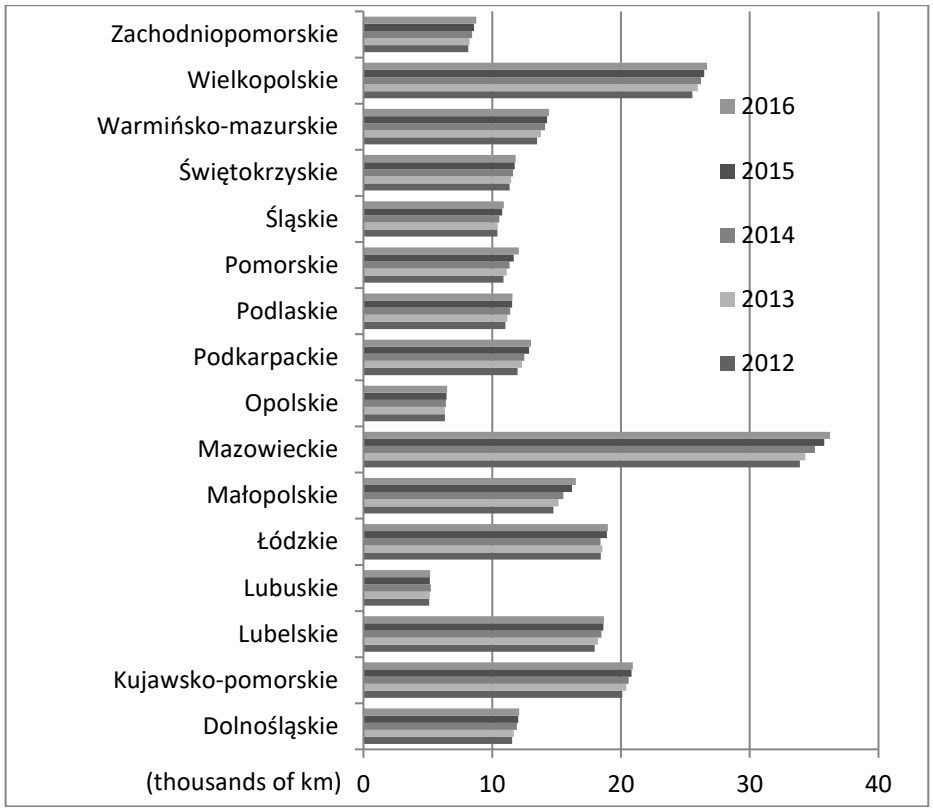

Fig. 7. Length of the collective water supply network in the countryside in Poland in 2012-2016, by voivodships (thousands of km) [7].

The relation of the collective length of the water supply network to the length of the collective sewage system has improved. In the initial period under consideration (in the year 2012), the relation of the length of the collective water supply network to the length of the collective sewerage network in the Polish village was as: 3,07 to 1. This means that the collective water supply network was over three times longer than the collective sewerage network. At the end of the year 2016, the analyzed relationship was shaped more favorably than: 2,59 to 1.

Among the analyzed voivodeships, the relatively most advantageous relation of the collective length of the water supply network to the collective sewage system in the countryside at the end of the analyzed period (2016) occurred in Podkarpackie Voivodeship (0,99 do 1), and the least favorable was in the rural areas of the Podlaskie Voivodeship (6,92 do 1). In terms of the analyzed relationship, the following series of provinces was formed: Podkarpackie Voivodeship (0,99 do 1), Małopolskie Voivodeship (1,51 do 1), Zachodniopomorskie Voivodeship (1,67 do 1), Pomorskie Voivodeship (1,69 do 1), Śląskie Voivodeship (1,73 do 1), Dolnośląskie Voivodeship (1,92 do 1), Opolskie Voivodeship (1,95 do 1), Lubuskie Voivodeship (2,40 do 1), Świętokrzyskie Voivodeship (2,69 do 1), Warmińsko-mazurskie Voivodeship (2,86 do

1), Wielkopolskie Voivodeship (3,02 do 1), Kujawsko-pomorskie Voivodeship (4,17 do 1), Mazowieckie Voivodeship (4,60 do 1), Lubelskie Voivodeship (5,00 do 1), Łódzkie Voivodeship (6,13 do 1), Podlaskie Voivodeship (6,92 do 1).

The lack of full coverage of the water supply network with the sewage system should be compensated by hermetic (technically efficient) septic tanks (septic tanks), which must be emptied regularly, in accordance with the relevant legal regulations. From the literature, however, it appears that such a procedure is not always the case. Some of these types of tanks are leaking. Not all of them are regularly pumped out by specialized equipment and their contents are exported to a sewage treatment plant. Some percentage of liquid waste (sewage) gets through the tank (cesspool). Sewage is seeping into the ground (into groundwater), which causes contamination of the natural environment [4, 8]. As a result, it threatens health and even human life.

5 Summary

Investment outlays on the development of a collective sewerage network in the countryside had the largest share in outlays on environmental protection in the Polish countryside in the years 2012-2016. This situation has been maintained since Poland's accession to the European Union and results from the need to improve the sanitary condition of the village.

European Union structural funds are a very important source of financing the development of a collective sewerage network in the countryside. In the audited period (in the years 2012-2016) from these funds the most funds were spent on the analyzed objectives, only slightly less funds came from budgets of local governments. Less significant in financing the development of the collective sewerage network in the countryside had resources that were spent from environmental protection and water management funds and from other sources (for example from the EcoFund). Residents of the village had a relatively small share in financing the development of a collective sewerage network in the area in which they live. The least important in financing the analyzed investments was expenditures expended from the state budget, which had a more significant role before Poland's accession to the European Union.

The material effects of the outlays incurred on the development of the collective sewerage system in the countryside were, in particular: an increase in the length of the sewerage system, an increase in the number of sewage connections to residential and commercial buildings, and an unfavorable relation of the collective length of the water supply network to the length of the sewage system.

The lack of full coverage of the water supply network with the sewerage system in the countryside is a premise for further capital outlays on the development of the sewerage network. In the absence of technical capabilities to build or expand a collective sewerage network or an exceptionally high capital-intensive nature of such investments, the construction of septic tanks for wastewater collection should be financially supported. The tanks of this type (septic tanks) already in operation must be systematically controlled in terms of their technical efficiency, their tightness is very important.

The development of the village sewerage system, and more broadly the improvement of water and sewage management in the countryside results from the Framework Water Directive adopted by Poland, the aim of which is to greening the village within the European Union. Such activities should be considered as a path leading to socially, economically and environmentally sustainable (ecological) development of rural areas of the European Union.

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