

Preventing Effects of Natural Disasters in Poland – Financial Aspects

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Abstract—In the article, there is verified the prevention of the natural disasters' effects. In the examined area of Poland, preventing the negative consequences of the extreme phenomena is financed from the central budget and from the budgets of local governments (self-governments). Expenses are assisted by the measures from e.g. foreign states, ecological funds, credits and loans. The hypothesis from the beginning of the article is verified positively: there is the co-relation between financing the prevention of natural disaster's effects and the European Union's programming periods. Thus, the answer for the research question of the article is: financing the prevention of natural disaster's effects is related to the European Union's programming periods.

Keywords- natural disaster, Poland, prevention, funding, financing, effects, European Union, EU,

I. INTRODUCTION

In 1997 and 2010 the area of Poland was affected by two great floods. The most devastating inundation the Oder River basin recently happened in the year 1997 and in the Vistula River basin – 2010. The landslides occurred after the flood in 2010 in the Carpathian Mountains. In 2015, the area of Poland was affected by drought.

Floods, droughts, landslides, and tornadoes are examples of natural disasters. These phenomena can be defined, according to the Natural Disaster Act, as an events connected with impacting of nature's forces. Besides mentioned examples, catastrophes are also: atmospheric discharges, storms, seismic activity, intensive rainfalls, extreme temperatures, fires, ice's phenomena on rivers, lakes, water reservoirs and the sea, infestations of insects and diseases of plants, animals and people[15].

The natural disaster can be launched by natural factors: hydrometeorological (e.g. the storm), biological (e.g. the disease), geological (e.g. the seismic activity). It is often a sudden event with tragic effects which causes damages, suffering of people and also changes connected with the affected area[1, 2].

The aim of this article is to verify the hypothesis: there is the co-relation between financing the prevention of natural disaster's effects and the European Union's programming periods. The research question of the article is: whether financing the prevention of natural disaster's effects is related to the European Union's programming periods?

It is worth to notice that the article is part of the research project 'Financing catastrophic damages' chaired by PhD Zbigniew Piepiora[9]. Some parts of the article shall be disseminated in the international scientific conferences.

II. THE METHODOLOGY

The data were collected from two databases: the EM-DAT [3] and the BDL – GUS [4]. Then the analysis in spreadsheet

was conducted. The currency was changed from Polish Zloty to US dollar. After the analysis the conclusions were drawn.

III. THE CHARACTERISTICS OF STUDIED AREA

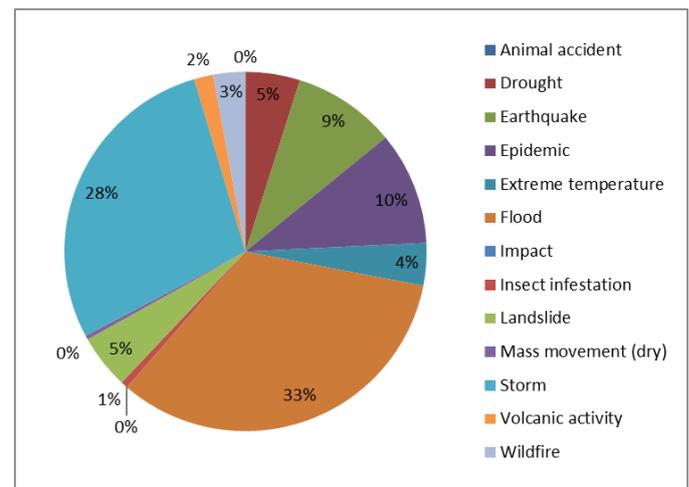


Figure 1. The manifestation of the natural disasters in the area of Poland in the years 1919-2015

Source: Own study on the basis of [3].

Poland (The Republic of Poland) is located at the Baltic Sea in the Middle-East Europe. The south part of the examined country has two mountain ranges called the Carpathian Mountains (Karpaty) and the Sudetes (Sudety). The main rivers of the state are Vistula (Wisła) and Oder (Odra). The climate of Poland is characterized as a transient of the mesothermal zone.

The manifestation of the natural disasters in the area of Poland in the years 1919-2015 period is presented on the figure 1. As we can see at the figure, floods and storms occurred most often in the examined area. Storms and the floods are hydrometeorological disasters[8, 10, 11].

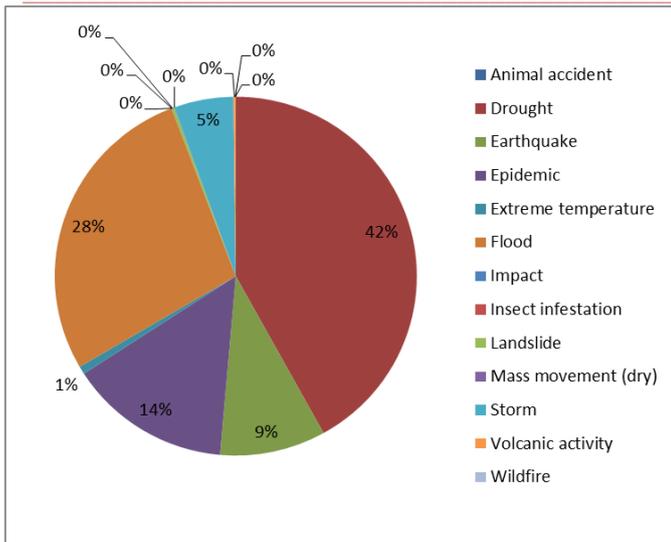


Figure 2. Deaths caused by natural disasters in the area of Poland in the years 1919-2011

Source: Own study on the basis of [EM-DAT 2015].

presented on the Figure 4. As we can see, 37% damages were caused by storms.

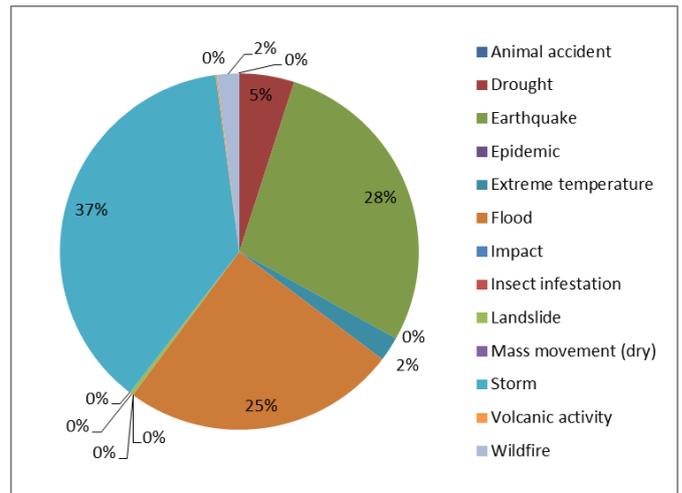


Figure 4. Damages caused by natural disasters in the area of Poland in the years 1919-2011

Source: Own study on the basis of [EM-DAT 2015].

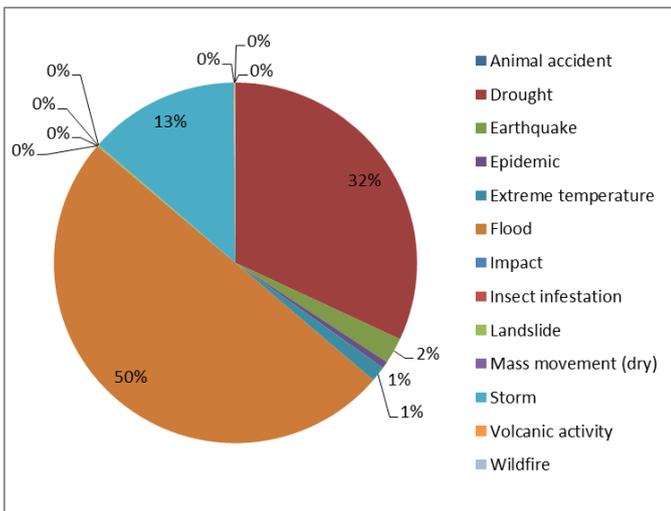


Figure 3. People affected by natural disasters in the area of Poland in the years 1919-2015

Source: Own study on the basis of [EM-DAT 2015].

The manifestation of the natural disasters in the area of Poland in the years 1919-2015 period is presented on the figure 1. As we can see at the figure, floods and storms occurred most often in the examined area. Storms and the floods are hydrometeorological disasters[8, 10, 11].

The percentage shares of various types of natural disasters in causing the deaths in the examined country in the years 1919-2015 are presented on the figure 2. As we can see, 42% people was killed by droughts, and 28% - by floods.

The percentage shares of various kinds of natural disasters in affecting the people in the examined state in the years 1919-2015 are presented on the Figure 3. As we can see, 50% persons was affected by floods and 32% - by droughts.

The percentage shares of various types of natural disasters in causing damages in Poland in the examined period are

IV. FINANCIAL ASPECTS OF PREVENTING EFFECTS OF NATURAL DISASTERS IN THE EXAMINED AREA

On the national, regional and local level the primary meaning in preventing effects of natural disasters by the Prime Minister with the Government and the Parliament has the Constitution of the Republic of Poland. The Constitution is completed adequately on the lower levels of the administration by the acts: about the Voivodship Self-Government[14]; about the County Self-Government[13]; about the District Self-Government[12]; and about the Voivod and the Government Administration in the Voivodship[16]. According to the article number 228 of the Constitution, in the situations of the extreme danger, such as the natural disaster, if the normal constitutional measures are insufficient, it can be introduced the adequate extraordinary state: the war state, the exceptional state or the natural disaster state [5]. In the case of the last state, the principles of proceeding are precised in the different law – the Act on State of the Natural Disaster [15].

Expenses for permanent assets serving the water management in Poland in the years 1998-2014 according to directions of investing are presented in the figure 5. Total expenses for permanent assets serving the water management in Poland in the years 1998-2014 amounted approximately 12.3 billion US dollars indexed to the year 2014. Total expenses were decreasing after the great flood in 1997. The highest level of total expenses and expenditures for levees, and water reservoirs and stages was noted a year after the great flood in 2010.

It is worth noting the increase in spending can be associated with the possibilities of funding from the EU before the accession to the European Union (PHARE, ISPA) and after accession to the European Union (2000-2006 programming period, the de facto 2004-2006 and 2007 -2013).

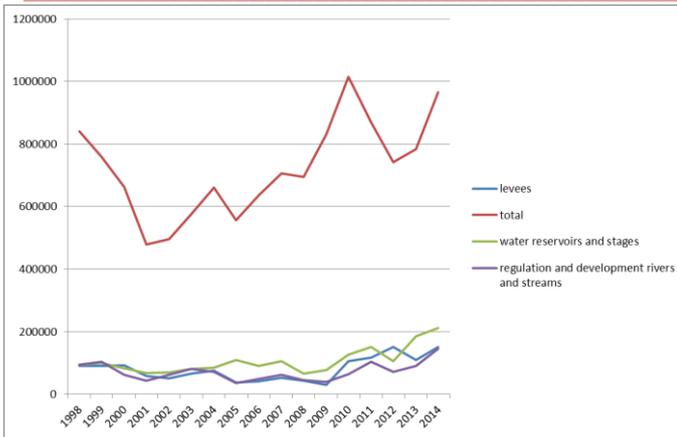


Figure 5. Expenditures permanent assets serving the water management in Poland in the period 1998-2014 – directions of investing (in ‘000 US dollars indexed to the year 2014)

Source: Own study on the basis of: [4, 5].

Effects of investing in the water management in the years 2003-2014 in Poland are presented in the figure 6. As we can see, data from this table are corresponding with data of the figure 5. In the period 1998-2013, there were built 216 water reservoirs and 2467 km levees. Almost 37% length of levees were built after the great flood 2010.

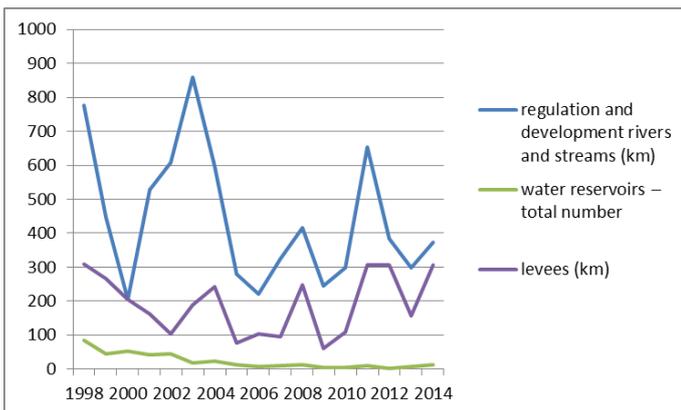


Figure 6. Effects of investing in the water management in the years 1998-2014 in Poland in the period 1998-2014

Source: Own study on the basis of: [4, 5].

Effects of investing in the water management – water reservoirs – total capacity – in the years 2003-2014 in Poland are presented in the figure 7. As we can see, data of the figure 7 are corresponding with data of previous fig. In the period 1998-2013, there were built 216 water reservoirs with the total capacity 0,22 km³.

Expenditures for permanent assets serving the water management – shares in the examined area in the years 2002-2013 according to directions of financing sources are presented in the figure 8. As we can see, the main source of expenses were own measures of investors. From these source, there were financed 40% of total expenditures in the examined period which totally exceeded 9.5 billion US dollars. 20% of total expences were financed from the foreign countries, i.a. from the budget of the European Union.

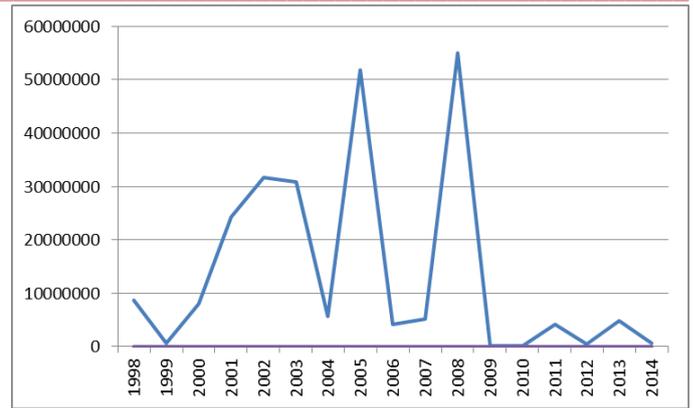


Figure 7. Effects of investing in the water management – water reservoirs – total capacity – in the years 1998-2014 in Poland in the period 1998-2014

Source: Own study on the basis of: [4, 5].

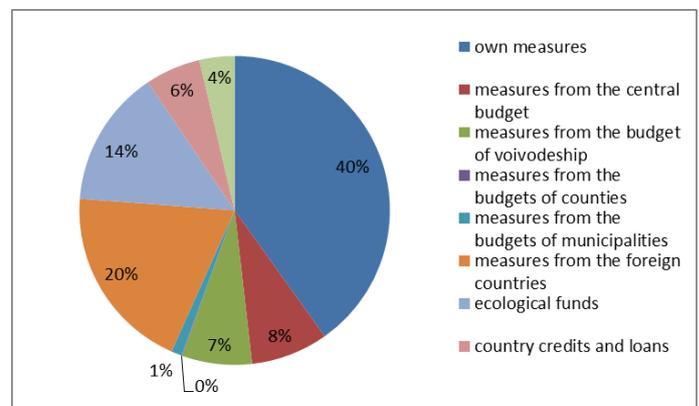


Figure 8. Expenditures permanent assets serving the water management – shares in Poland in the period 2002-2014 – directions of financing sources (in ‘000 US dollars indexed to the year 2014)

Source: Own study on the basis of: [4, 5].

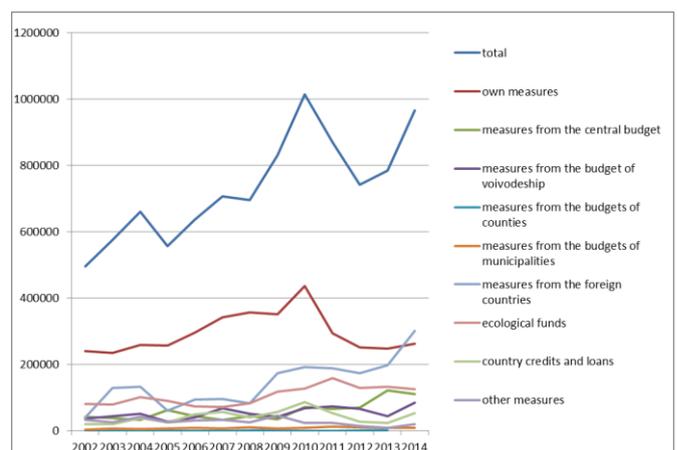


Figure 9. Expenditures permanent assets serving the water management in Poland in the period 2002-2014 – directions of financing sources (in ‘000 US dollars indexed to the year 2014)

Source: Own study on the basis of: [4, 5].

Expenditures for permanent assets serving the water management in the examined area in the years 2002-2013 according to directions of financing sources are presented in the figure 9. It confirms a link between increasing expenditures and

the possibilities of absorption of the European Union's measures – a significant increase until 2003, after a significant decline until 2005, then increase until 2007 (it is considered one year delay due to bureaucratic procedures – the means can be captured a year later, and then spend a year longer than the time of the designation of the programming period). There is a lack of data for the period 1998-2001 but it should be noted a significant increase in expenditures in 2010 and 2011.

Expenses for water management were co-financed from ecological funds. One of these funds is the Fund for Environmental Protection and Water Management. Charges and incomes to this fund in Poland in the years 2002-2014 amounted over 5.4 billion US dollars. As we can see in the figure 10, incomes from charges for air protection and climate (42%) were the main part of total incomes and amounted approx. 2.4 billion US \$.

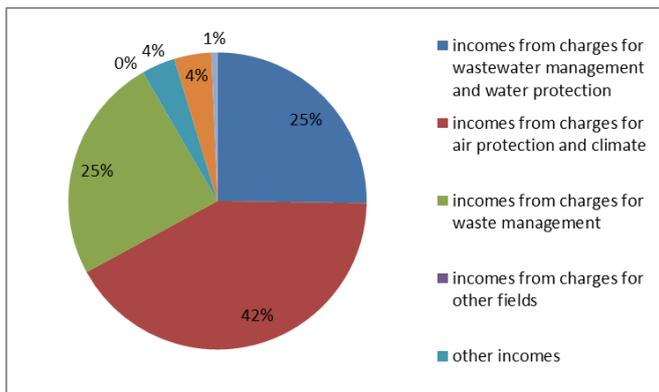


Figure 10. Charges and incomes to the Fund for Environmental Protection and Water Management – shares in Poland in the period 2003-2014 – directions of financing sources (in '000 US dollars indexed to the year 2014)

Source: Own study on the basis of: [4, 5].

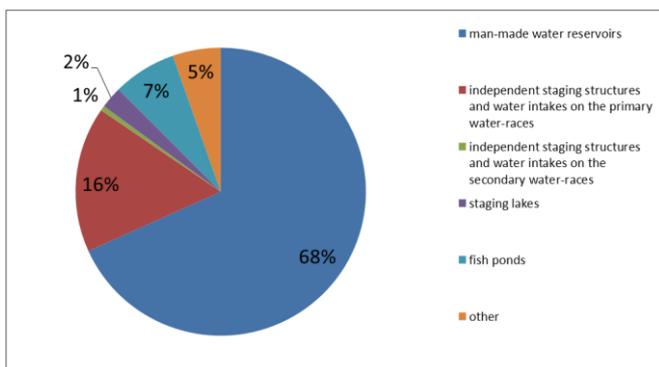


Figure 11. Investing expenses for the low water retention – shares in Poland – directions of investing in the years 2003-2014 (in '000 US dollars indexed to the year 2014)

Source: Own study on the basis of: [4, 5].

Investing expenses for the low water retention – shares in Poland in the years 2003-2014 according to investing directions are presented in the figure 11. Investing expenditures for man-made water reservoirs exceeded 167 million US dollars. Total investing expenses for the low water retention amounted approximately 245 million US \$. The highest levels of total expenses were noted after the great flood in 2010. As we can

see in the figure 11, the main direction of investing were man-made water reservoirs (68%).

Investing expenses for the low water retention – shares in Poland in the years 2003-2014 according to financing sources are presented in the figure 12. As we can see, expenses were financed mainly from structural funds of the European Union and from the other sources.

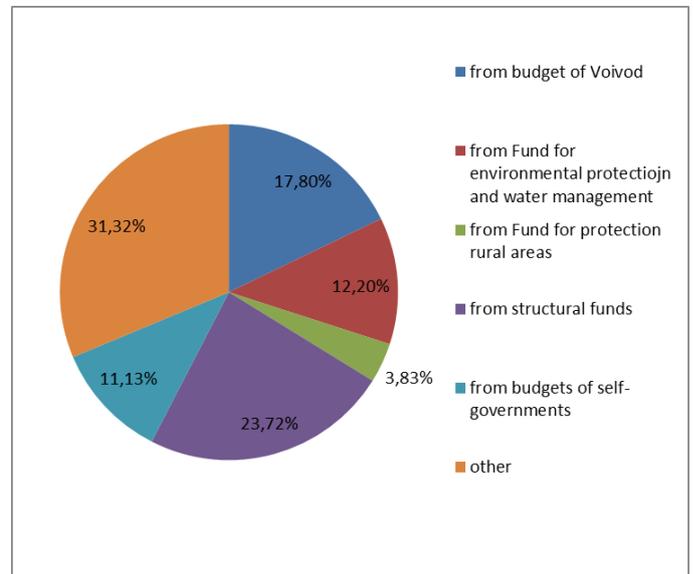


Figure 12. Investing expenses for the low water retention – shares in Poland – directions of investing in the years 2003-2014 (in '000 US dollars indexed to the year 2014)

Source: Own study on the basis of: [4, 5].

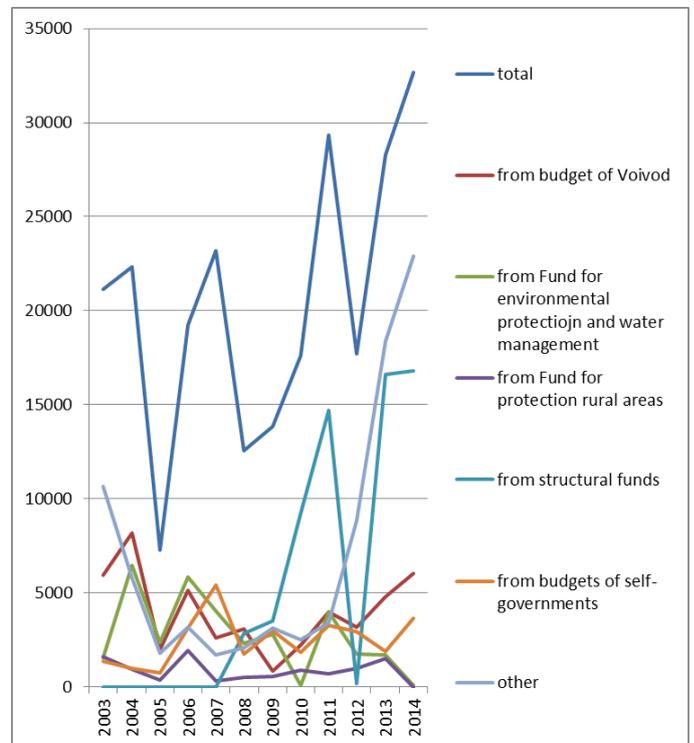


Figure 13. Investing expenses for the low water retention in Poland – directions of investing in the years 2003-2014 (in '000 US dollars indexed to the year 2014)

Source: Own study on the basis of: [4, 5].

Investing expenses for the low water retention in Poland in the years 2003-2014 according to financing sources are presented in the figure 13. Once again, there is a link between increasing expenditures and the possibilities of absorption of the European Union' measures – a significant decline until 2005, then increase until 2007. There is a lack of data for the period 1998-2002 but it should be noted a significant increase in expenditures in 2010 and 2011. The highest level of expenses was noted a year after the great flood in 2010.

Effects of investing in the low water retention are presented in the figure 14. The range of objects in Poland in the years 2003-2014 amounted 6750. Total increasing capacity in the examined period exceeded 87061 m³. The figure 13 is corresponding with the previous fig.

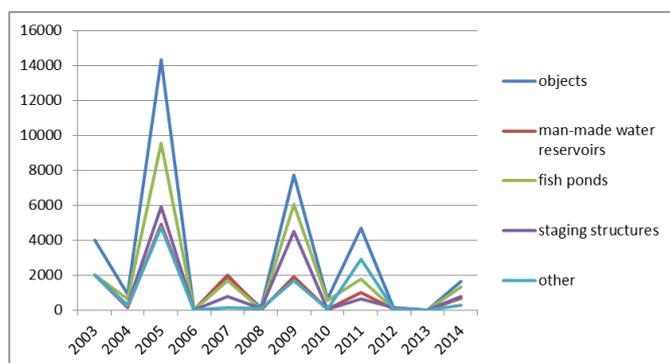


Figure 14. Effects of investing in the the low water retention – the range of objects in Poland in the years 2003-2014

Source: Own study on the basis of: [4, 5].

V. CONCLUSION

After conducted analysis, the following conclusions can be drawn.

The hypothesis from the beginning of the article was verified positively: there is the co-relation between financing the prevention of natural disaster's effects and the European Union's programming periods. Thus, the answer for the research question of the article is: financing the prevention of natural disaster's effects is related to the European Union's programming periods.

Expenditures for permanent assets serving the water management in the examined area in the years 2002-2013 confirm a link between increasing expenditures and the possibilities of absorption of the European Union' measures – a significant increase until 2003, after a significant decline until 2005, then increase until 2007 (it is considered one year delay due to bureaucratic procedures – the means can be captured a year later, and then spend a year longer than the time of the designation of the programming period). There is a lack of data for the period 1998-2001 but it should be noted a significant increase in expenditures in 2010 and 2011.

The link is confirmed once again by investing expenses for the low water retention in Poland in the years 2003-2014. Expenses were financed mainly from structural funds of the European Union and from the other sources. Once again, there is a link between increasing expenditures and the possibilities of absorption of the European Union' measures – a significant decline until 2005, then increase until 2007. There is a lack of

data for the period 1998-2002 but it should be noted a significant increase in expenditures in 2010 and 2011. The highest level of expenses was noted a year after the great flood in 2010.

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