Pol. J. Environ. Stud. Vol. 23, No. 3 (2014), 1025-1031

Short Communication

Risk of Natural Catastrophes and Ecological Safety of a State

Jarosław W. Przybytniowski*

European Business Club Association e.V., Castel Oedheim, FRG, Institute of Management,
Jan Kochanowski University,
Świętokrzyska 21, 25-406 Kielce, Poland

Received: 16 June 2013
Accepted: 29 January 2014

Abstract

Natural and unnatural catastrophes create hazards and cause increasing damage not only to property, but also claim more and more lives. The cause of this state of affairs can be found firstly in climate changes[1)] and secondly in the economic development of countries exposed to these risks (the increase in the infrastructure value and in the number of inhabitants in these areas). The subject of catastrophes, including ecological disasters and their outcomes, raises more and more voices calling for the introduction of systemic solutions whose effect will be to minimise the financial effects of these catastrophes. One such element is insurance instruments [1-6]. This article is a continuation of research conducted in the EU states and in southeastern Poland with respect to the awareness of insurance coverage among people living in individual households as a method for reducing these risks.

Keywords: natural environment, natural disasters, insurance, awareness, damage liquidation

Introduction

This article is a result of a sequence of research conducted together with the European Business Club Association and the European Academy of Technology and Management (No. T270/S185 (CERIF) No. 2007/10/01). The main premise of taking up the problem are natural and unnatural disasters, which are a growing hazard to constantly developing world economies, as well as to millions of human beings, and the losses that they cause not only to property but also to the natural environment. The team formed, apart from looking for alternative sources of energy, decided to study these phenomena in terms of insurance. Thus, the areas of research with which the author deals are: the appearance of catastrophic risks, and their economic and insurance effects on individual world economies and on the environment, in particular.

Firstly, the research included individual households of southeastern Poland and the:

1) Awareness of people who are exposed to these risks
2) Knowledge of insurance as a method of reducing risks of natural and unnatural catastrophes
3) Procedures of damage liquidation by insurance institutions

The basic, primary aim of my research conducted is to answer whether:

1) There is a possibility to determine the most optimal model of reducing the effects of natural and unnatural phenomena
2) Searching for alternative sources of energy is a suffi-

*e-mail: j.w.przybytniowski@wp.pl

[1)] The IPCC and NAS reports and the report published by the G8 Group state that most temperature changes observed in the last 50 years are due to human activity. There is about a 5% probability that these changes are caused by natural factors. During the last hundred years the temperature changes observed on the surface of the Earth amounted to about 0.4-0.8ºC.

cient panacea for climate changes caused mainly by human activity (excessive gas emissions)[2)]

The answer to the first question (which is the subject matter of this paper) will be possible after a detailed analysis of the specificity of these phenomena, the analysis of the solutions already in use, as well as the presentation of studies connected with the society awareness, regarding preventive measures, i.e. insurance contract, and the basic instruments facilitating liquidation of incurred damage. The results of the first study have already been presented in previous works [3-5]. The second stage presents the results of the research conducted among people living in households in southeastern Poland where three floods have been noted in recent years (since 1997).

Natural Catastrophe and Natural Disaster

Before I go on to the principal part of the work, a few sentences about the difference between a natural disaster and a natural catastrophe. Often in everyday life, as well as among the employees of insurance institutions, we can notice that these concepts are used interchangeably [7]. Therefore, it should be emphasized here that, in light of the subject literature, these concepts are not the same [8]. In simplest terms, it can be said that a natural catastrophe is an event connected with the impact of natural forces (e.g. atmospheric discharge, earthquakes, tornadoes, hurricanes, landslides, fires, draughts, floods, and pandemics among people, plants, or animals), with which there appears damage to property, or injury and death [2, 9, 10].

However, the concept of a natural disaster is connected with the description of the phenomena included in the wider concept, such as: calamity, distress, and extreme event that causes significant damage. That is the element that a man faces but which he is in no way able to prevent. Analyzing the literature – by natural disaster [11-16] we should understand a natural catastrophe or technical failure whose effects threaten property, as well as life or health of a large number of people to a great extent, or the environment in a large area [17]. Moreover, the assistance and liquidation of the effects of a natural disaster take place and become effective when extraordinary measures are taken, as well as in cooperation of various specialist institutions acting under uniform management. In the opinion of the Author, a natural disaster is connected with the forces of nature and technical failures caused by human actions, which people are unable to foresee and overcome. Natural disasters include disasters related to the four elements: air, water, fire, and earth (Fig. 1). They are connected with such disasters as: hurricane, flood, fire, and earthquake or drought, which deprive people of property, health, and life.

Ecological Safety and Areas at Risk of Ecological Disasters

In the widely understood terminology of security[3)] safety [18-24] a new term has appeared – ecological safety. During production industrial gases are emitted which pollute the air, while municipal waste, post-production waste, various chemical substances, and household rubbish pollute the earth. At the turn of the 20th and 21st centuries, besides natural hazards caused by natural factors and technical failures caused by human actions, there appeared new hazards, particularly ecological ones.

On the basis of the available literature [25-30] connected with ecological safety, there is no uniform, valid definition. In accordance with the most frequently used definition [14, 15, 17, 31], ecological safety should be understood as a relative public safety free from environmental hazards caused by human factor as a result of physical processes or due to negligence, accident, mismanagement or design, which comes from home or abroad. On the basis of the existing publications, the author thinks that ecological (environmental) safety is developing natural and social relationships in the Earth's biosphere which create proper living conditions for all of humankind while not impairing the fundamentals of life on our planet. Apparently, ecological safety is a process where, with the participation of many components, actions should be adapted to the sphere of international cooperation, to the development strategy of a given country and to the collective ecological awareness of its society, characterized by:

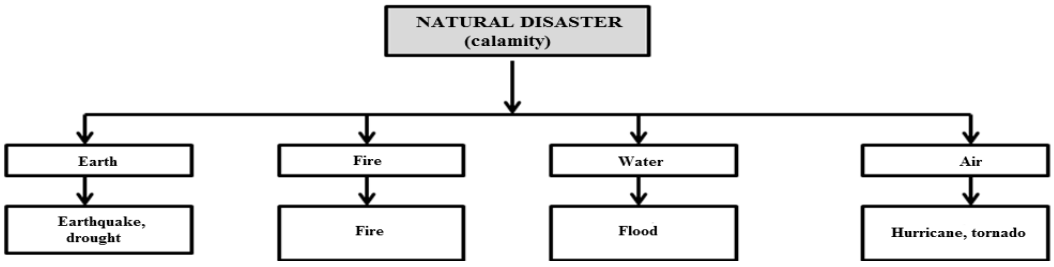

Fig. 1. Definition of natural disaster.
Source: Author's own work.

[2)] The subject of the second part of the article

[3)] In English there are two words which mean *bezpieczeństwo*: "safety" and "security." Safety is the state of being safe (from French *sauf* and from Latin *salvus*) and protected from danger (*niebezpieczeństwo* in Polish), evil, damage, accidents and other non-desirable events. It is a steady state, whereas "security" (from French *securite* and from Latin *securitas*) is a process of preventing or protecting against dangers that may threaten or destroy this steady state. Hence, we can say that we can be safe in a place that is secure. The term "ecological safety" is more often used in English than "ecological security."

Table. 1. Data of respondents in particular voivodeships.

Voivodeship	2011		2012		Average
	Number	%	Number	%	%
Małopolskie	19	14.2	18	13.8	14.0
Podkarpackie	53	39.6	51	39.2	39.4
Świętokrzyskie	62	46.3	61	46.9	46.6

Source: Author's own work

1) Clean air, healthy water, and safe food [13, 17]
2) Possibility of recreation and leisure [19]
3) Permanent existence of all wildlife [2, 6, 25, 27].

Methods

The research was carried out twice: from August to October 2011 and from August to October 2012.

The research referred to the assessment of catastrophic hazard occurrence, its effects, and the assessment of social and economic effects on people living in individual households (single-family houses) using a questionnaire method. The aim of the study was to examine insurance awareness, the quality of the service offered, and preferences in the field of insuring property against the effects and results of risks of natural catastrophes and their outcome. Having analyzed the Polish insurance market of contracts offering customers insurance cover against the effects of the described risks, it appeared that in our market there is practically one contract whose package includes such risks as: hurricane, flood, fire – this is a policy against fire and other unfortunate events. The research did not consider farm owners, who are covered by a mandatory contract on farm buildings[4] [32].

The questionnaire (prepared by a team of researchers) consisted of 12 questions divided into three parts and addressed to house owners in the voivodeships of south-eastern Poland (Świętokrzyskie, Podkarpackie, and Małopolskie):

1) Knowledge of risks connected with insurance coverage against weather anomalies, their effects, and insurance institutions offering this kind of coverage
2) Decisions connected with mitigating financial effects of catastrophic events
3) Customer service quality (including damage liquidation)

The research was conducted through pollsters trying to reach the highest number of households that in the last two years (2011-12) were affected by any risk of a natural catastrophe. The respondents were directly contacted. The data needed was taken from the local self-government in municipalities and administrative districts, as well as from the data of the general census conducted in Poland between 1 April and 30 June 2011[5].

The questionnaire in the number of 165, was addressed to individual people living in single-family houses[6] which in the years 2011-12 were affected by weather anomalies that resulted in great property and environmental damage. Completed questionnaires from 2011 (134, 81.2%) and 130 questionnaires from 2012 (78.8%) were directly analyzed (Table 1). The highest percentage were the forms completed in Świętokrzyskie and Podkarpackie (Tarnobrzeg and Sandomierz administrative districts).

Most positive answers were received in Świętokrzyskie Voivodeship (the two-year average – 46.6%), of which the most active administrative district was the Tarnobrzeg District, where most respondents come from – nearly 65%. The next was Podkarpackie Voivodeship (two-year average – 39.4%) and here the most active was the Sandomierz District – nearly 72%. The reason for the activeness of the inhabitants of this area was the flood that affected this area in spring 2010. The lowest percentage of active respondents willing to answer the questions included in the questionnaire was recorded in Małopolskie Voivodeship – the two-year average amounted to 14%.

The chi-squared test, which is the most commonly used non-parametric test, was used to test the association between qualitative variables (choices made by the respondents). The author applied this test to verify the initial hypothesis. The only assumption underlying the use of this test (besides random sampling) is the fact that expectations should not be too low. Confirming (by means of the chi-squared test) the association between the variables does not let us define the strength of the association between them. In order to determine this proposed measure statistical Phi-Yule.

[4] Analysis of research on farm owners will appear in a separate article.

[5] The 2011 Census included people domiciled on the territory of Poland regardless of the fact whether they were staying in the country during the census or were residing abroad or were registered for temporary stay. The census was conducted in buildings, flats, places of collective accommodation or any other inhabited places that are not dwellings. Initial results of the census indicated that on the 31 day of March 2011 there were about 6,111,000 buildings. Residential buildings amounted to 97.7% of the total number of buildings (5,970,000), of which the majority were single-family houses (5,522,000). The number of multi-residential buildings amounted only to 447,000, while places of collective accommodation stood at 4,000.

[6] The research was carried out among the same inhabitants of single-family houses in 2011-12 in order to make the research results more valid.

Table 2. Respondents' sources on real estate financing.

Viovodeship	2011			2012		
	Own [%]	Bank [%]	Loan (family, friends) [%]	Own[%]	Bank [%]	Loan (family, friends) [%]
Małopolskie	2.2	5.2	6.7	1.5	5.4	6.9
Podkarpackie	3.7	26.1	9.7	2.3	26.9	10.0
Świętokrzyskie	4.5	35.8	6.0	3.8	36.9	6.2

Source: Author's own work

The Results of the Survey

The first part of questions included in the questionnaire refers to the geographic location of respondents, the sources of financing the real estate where they live, hazards which occur or may occur in their area, and the knowledge of risks connected with insurance cover against natural and environmental catastrophes, as well as insurance institutions offering such insurance.

In terms of location, the highest percentage of people responding to the questions live in rural areas in the vicinity of towns. Next were the people living in villages. Whereas the people who were reluctant were those living in towns.

The next stage of the research included information about the real estate area. This information offers an answer to the question of correlation between (Table 2):

1) Insurance coverage and property value
2) Insurance contract conclusion and sources of financing

The data provided by the respondents imply that the highest percentage of respondents, in order to build or rebuild their property, used mortgage credit, irrespective of the voivodeship in which the property is located. Nearly 70% of the respondents use banking services and this indicator practically remained unchanged in the research period, while almost 8% use or used their own resources. This indicator was down by about 3% in 2011. The additional information that could be received here is that nearly 70% of the respondents, while rebuilding their property after weather anomalies, used the services of insurance institutions and received compensation.

In this part, the respondents also answered the question about the knowledge of insurance risks in the case of weather anomalies that may occur. From among the risks that appear in the insurance package against fire and other unfortunate events, the respondents often mentioned flooding. This risk was indicated by over 92.3% of the respondents in 2012. This indicator increased by 0.5% in 2011. The next risks mentioned by the respondents were water-supply damages (69.2 – up by 2.8% in 2011) which, as the respondents indicated, has an important impact on the environment. On the opposite side, they mentioned: landslide (3.85), over-voltage caused by atmospheric discharge (7.7%) and permeation (7.7%). In the next part of the survey the respondents were supposed to indicate an insurance institution and assess it in terms of their satisfaction or the lack thereof. On a scale from 0 to 6 the respondents assessed the quality of customer service, especially in terms of: damage liquidation, professionalism of employees of an insurance institution, and, in consequence, their decision to resign from or continue the insurance contract. For this author, a vital part of the research was to answer the question whether there is a correlation between customer service quality, which is one of the fundamental factors determining the competitiveness of insurance institutions in the insurance market [5, 33], and the continuation of or the resignation from the insurance coverage.

In the survey assessing specific insurance institutions in terms of customer service quality, every fourth respondent indicated Ergo Hestia, giving it a positive grade (28.4%) and declaring their continuation of the insurance coverage in this company. This positive assessment in 2011 changed in favour of the company by 1.5%. The lack of satisfaction was indicated by 10.4% and this indicator did not change in comparison with 2011. The next institutions that received a positive grade were Warta and Allianz, with a low indicator of negative grades. However, on the opposite side, the customers indicated Link4, which was positively assessed by 1.5%. It is worth noting that PZU, indicated by 7.5%, was found in the middle in terms of positive grades, while quite a high indicator of negative grades (32.3%) placed this institution in the last position. The research showed that this result was influenced by flood damage liquidation in 2010 and 2011, as well as the attitude of this insurer's employees toward customers. As a result, the majority of respondents declared a change in insurer. From among insurance institutions mentioned by customers there were also: Compensa, Genarali, HDI ASEKURACJA, INTERRISK, AXA, and UNIQA. Bearing in mind the development of competitiveness[7], it is important to indicate the market position of particular insurance institutions, considering the correlation between customer service quality and continuation or resignation from insurance coverage. For the respondents who concluded an insurance contract, the most important factors were: professionalism of employees of an insurance institution and their assistance in damage liquidation (Tables 3 and 4)[8].

[7] The state of knowledge on research connected with the analyzed problem was described by me in the article "Quality and safety in insurance service distribution" in the magazine *Securitologia*.

[8] To study the relationship between qualitative variables (choices made by the respondents), the chi-squared test was used, as it is the most often used non-parametric test.

Table 3. Professionalism of an insurance institution employee.

Specification	Agent's professionalism			Agent's professionalism		
	2011			2012		
	Value	df	Asymptotic significance (2-tailed)	Value	df	Asymptotic significance (2-tailed)
Pearson's chi-squared test	42.754	1	0.00000	42.766	1	0.00000
Linear correlation test	42.514	1	0.00000	42.499	1	0.00000
N important observations	134			130		

Source: Author's own work

Table 4. Insurance institution employee and assistance in damage liquidation.

Specification	Assistance in damage liquidation			Assistance in damage liquidation		
	2011			2012		
	Value	df	Asymptotic significance (2-tailed)	Value	df	Asymptotic significance (2-tailed)
Pearson's chi-squared test	7.811	1	0.005	7.845	1	0.005
Linear correlation test	7.767	1	0.005	7.788	1	0.005
N important observations	134			130		

Source: Author's own work

As the data included in the above table indicate, among the total number of respondents in the research period there is a relationship between an employee's professionalism and the choice of an insurance institution. The statistics value is statistically significant and amounts to, respectively:

a) 2011 – Chi^2 (df=1, N=134) = 42.754, p< 0.001 (strength of association measured with Phi and Cramer's V coefficient is 0.490)
b) 2012 – Chi^2 (df=1, N=130) = 42.766, p< 0.001 (strength of association measured with Phi and Cramer's V coefficient is 0.490)

The data analysis shows that in the research period among the total number of respondents there is a relationship between assistance in damage liquidation and the choice of an insurance institution. The statistics value is statistically significant and amounts to, respectively:

a) 2011 – Chi^2 (df=1, N=134) = 7.811, p< 0.01 (strength of association measured with Phi and Cramer's V coefficient is 0.209)
b) 2012 – Chi^2 (df=1, N=130) = 7.845, p< 0.01 (strength of association measured with Phi and Cramer's V coefficient is 0.209)

An interesting observation made by the author during the research is information about insurance awareness of customers of insurance institutions. One of the basic security measures required by banks from their customers is holding an insurance contract insuring properties against fire and other events. Hence, we may say that holding an insurance contract as security against a customer's credit obligations (mortgage credit) in the bank is not fully the customer's conscious choice. We can call this form of concluding insurance contracts "an order" for the customers which banks use as collateral for liability repayment. This order is closely related to the transfer of the title of ownership (assignment of rights) from the insurance contract onto the crediting bank. On the basis of the collected results, we can say that, were it not for the bank credit, every other respondent would be capable of resigning from the insurance contract due to the employees' lack of professionalism and inadequate assistance in liquidating the so-called "flood" damage and its effects. It appears from the data that, had it not been for the mortgage credit, the majority of the respondents would have resigned from the insurance cover due to insurance service quality. The remaining group of responders would have withdrawn from the contract due to the high insurance premium (18.7%) or the coverage (9.7%)[9].

Conclusions

Analyses refer to the risk of natural catastrophes allow us to draw the following conclusions:

1. The number of natural catastrophes is gradually growing and, in particular, the number of catastrophes caused by floods, hurricanes and, in consequence, the costs accompanying them which directly or indirectly influence emerging ecological damage.

[9] Analyses in relations to the inhabitants of particular voivodeships

2. The damage which accompanies the risks of natural hazards more and more substantially affects property and health of endangered people who are not able to repair it by means of their own financial resources.
3. One of the basic sources of financing the damage connected with natural catastrophes and, consequently, ecological damage, is security in the form of a bank loan (mortgage) and buying insurance coverage (comprehensive insurance – against fire and other calamitous events).
4. It is essential to implement a uniform system of financial securities essential to repair the destruction caused by natural disasters and, consequently, ecological damage.
5. Introducing a national program on a large scale will raise the awareness of people at risk of natural and ecological catastrophes.
6. Although we have been living in a new social and economic system for over 20 years, there are still inadequate insurance programs covering the property and life of insurance customers. Also, there is still a lack of mechanisms sufficient to liquidate the effects of natural catastrophes and, consequently, of ecological catastrophes.
7. The research (the analysis of three voivodeships in southeastern Poland) proved the reluctance of house owners to conclude insurance contracts, as well as to decide on their continuation. We can presume that situations like this happen all over Poland [34].

The research, initiated by me and conducted together with the European Business Club Association and the European Academy of Technology and Management within the framework of project No. T270/S185 (CERIF) No. 2007/10/01, has inspired the team to conduct further studies. The measurable effects of the research conducted so far and already published earlier, was:

1. Chart: Determinants of insurance service quality, according to the research.
2. Chart: Insurance paradigm, including insurance contract restitution.
3. Chart: Customer behaviour model in purchasing the insurance service.
4. Chart: Attributes of insurance service quality based on Gummensson's quality model.
5. Preparation of a model calculating the forecast of the market development of an insurance agent as one of the main subjects determining insurance service quality.
6. Development of the so-called "complaint measure."
7. New approach to damage assessment of catastrophic risks by insurance and reinsurance institutions.

I think that conducting further research and obtaining additional empirical data will make it possible to assess more precisely, firstly, our insurance market capacity with regard to package insurance connected with catastrophic risk coverage, secondly the increase in the awareness of hazards arising from these risks for property owners, and thirdly the extent to which our country is prepared to implement the solutions already in operation not only in the world but in Europe.

References

1. BANKS E. Catastrophic Risk. Analysis and Management, John Wiley & Sons, Ltd, West Sussex, 69-85, **2005**.
2. HOFFMANN B. (Ed.) Disaster Risk Management – Working Concept, German Agency for Technical Cooperation, Eschborn, 63, **2002** [In German].
3. PRZYBYTNIOWSKI J.W., STASCH A. Ecological Safety and the Dark Side of Technology, [In]: Pol. J. Environ. Stud., **21**, (5A), 346, **2012**.
4. PRZYBYTNIOWSKI J.W., PRUSACZYK P. Environmental safety for example Świętokrzyskie voivodship. Selected topics, [In:] JĘDRZEJUCZYK I., NOWAK S.T., PRZYBYTNIOWSKI J.W., SOPOĆKO A. Regional program against the EU's "Europe 2020", including the role of insurance as an example Świętokrzyskie voivodship, CONTACT, Poznań, 331-350, **2012** [In Polish].
5. PRZYBYTNIOWSKI J.W. Disaster Risk Management, Economics and Organization of Enterprises No. **4**, (759), Warszawa, 35-44, **2013** [In Polish].
6. TERMINSKI B. Environmentally-Induced Displacement. Theoretical Frameworks and Current Challenges, CEDEM, Université de Liège, **2009**.
7. SORDYL G., PŁONKA M. Environmental insurance as a method of financing risks in mining, Insurance News, 1/2010, Warsaw, Poland, 91-105, **2010** [In Polish].
8. RIEZANOW I.A. Big disaster in the history of the Earth, PWN, Warsaw, 176, **1986** [In Polish].
9. BANKS E. Catastrophic Risk. Analysis and Management, John Wiley & Sons, Ltd, West Sussex, 69-85, **2005**.
10. BAC M. The essence of catastrophe risk in real estate, /In:/ JĘDRZEJCZYK I. (Ed.), Insurance catastrophe risk, University of Economics in Katowice, Katowice, 191, **2008** [In Polish].
11. ABBOTT P.L. Natural disasters. 7th ed. Dubuque, IA, McGraw-Hill, 397, **2009**.
12. BAILEY N.J., SWINERD G.G., LEWIS H.G., CROWTHER R. Global vulnerability to near-Earth object impact, Risk Management, **12**, 31, **2010**.
13. DAVIS L. Natural disasters. New ed. New York, Facts on File, Inc, 195-206, **2008**.
14. INGRAM J. C., FRANCO G., RIO C. R., KHAZAI B. Post-disaster recovery dilemmas: Challenges in balancing short-term and long-term needs for vulnerability reduction, Environmental Science & Policy, **9**, (7-8), 607, **2006**.
15. LEVINE JN., ESNARD A., SAPAT A. Population displacement and housing dilemmas due to catastrophic disasters; Journal of planning literature, **22**, (3), 3, **2007**.
16. YAROTHKIN, W.I., ЯРОЧКІН, В.И., Securitology – the science of safety. Moscow, **1989** [In Russian].
17. ISENMANN R. Environmental Informatics and Industrial Ecology – Scientific Profiles of Two Emerging Fields Striving for Sustainability, [In]: MOLLER A., PAGE B., SCHREIBER M. (Ed.), Environmental Informatics and Industrial Ecology, 22nd International Conference on Informatics for Environmental Protection, Leuphana University Lueneberg, Germany, September 10-12, **2008**.
18. ČECH Ľ. Safety aspects of education of the Armed Forces - view social science teacher /In:/ Safety and Security Science (Safety and Security Science). Liptovsky Mikulas: Armed Forces Academy of General M. R. Štefánika, 219-224, **2009** [In Slovakian].
19. KORZENIOWSKI L.F. Fundamentals of Safety Science. Difin, Warszawa, 76, **2012** [In Polish].

20. SMITH K. Environmental hazards: assessing risk and reducing disaster, 5th ed. Milton Park, Abingdon, Oxon; New York, NY: Routledge, 383, **2009**.
21. SERIKOV Y.A., KORZENIOWSKI L.F. Safety - securitology a. Kharkov: KSAME, **2010** [In Ukrainian].
22. ŠKVMDA F. Selected sociological characteristics of safety issues in the contemporary world. [In]: K. Čukan et al., Youth and army. Bratislava, MO SR, 41, **2005** [In Slovakian].
23. ZAPLATYNSKYJ M.V., Terminology of the science of safety. [In:] Security and safety science education. Proceedings of the international conference Liptovsky Mikulas: Armed Forces Academy of General M. R. Štefánika, **2006** [In Russian].
24. ZIELIŃSKI K. Security of citizens during crisis and non-military response in case of emergencies and natural disasters, Publisher AON, Warsaw, 29, **2004** [In Polish].
25. DODDS F. HIGHAM A. SHERMAN R. (Ed.). Climate Change and Energy Insecurity: The Challenge for Peace, Security and Development, London. Earthscan, **2009**.
26. EHRLICH P.R., EHRLICH A.H. Population, development, and human natures. Environment and Development Economics **7**, 158, **2002**.
27. FLOYD R. Typologies of Securitisation and Desecuritisation: The case of US environmental security 1993-2006, Unpublished Doctoral thesis, University of Warwick, 53, **2007**.
28. GLEICK P.H. The implications of global climatic changes for international security. Climatic Change **15**, (1/2), 309, **1989**.
29. PILLMANN W., GEIGER W., VOIGT K., Survey of environmental informatics in Europe. Environ. Modell. Softw. **21**, (11), 1519, **2006**.
30. New Webster's Dictionary of the English Language. College Edition. Delhi: Surjeet Publications Reprint 1988.
31. HÜTTMANN F. German environmental vs. computer science. Conservation, GBIF, Rio, Statistics and sustainability. Is the horse we save already dead? Newsletter environmental computer science **41**, 11, **2007** [In German].
32. JOURNAL of LAWS No. 124, item 1152 with later amendments
33. JĘDRZEJCZYK I. Catastrophic risk and a necessity of using an insurance protection, [In:] Jędrzejczyk I., Bożyk – Węglarz S. (Ed.), The insurance of catastrophic risk in the European Union and the Global Changes, Publisher of the Karol Adamecki University of Economics in Katowice, Katowice, 9-10, **2007** [In Polish].
34. www.knf.gov.pl/opracowania/rynek