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Catastrophe risk management in Romania and Transylvania' specifics. Issues for national and local administrations

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ABSTRACT

Worldwide catastrophic events have increased significantly in the last century and caused global economic losses and impacted people lives. Given the circumstances it is necessary for all countries to set up policies, procedures in order to identify, to evaluate, manage and monitor catastrophic risks. Insurance represents one of the solution available in the market for managing catastrophic risks. This paper will study the attitudes of different European countries towards catastrophic risk protection and then we study the Romanian Pool Against Natural Disaster. We concentrate the research on two major areas, earthquakes and floods risks, based on the fact that Romania is most exposed to these risks.

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1. Introduction

The world is full of risks (Baker & Simon, 2002) and uncertainty (Chang, 2015). All economy sectors face many risks. Risk can be considered any event that can affect the ability of a company to achieve its objectives and to follow its strategies. In order to find any risk that can negatively impact humans and any human activity we need to answer to the following answers (Rausand, 2011): What can go wrong?, What is the likelihood of that happening? What are the consequences?

In order to manage the risk, to take the right decisions, and in order to maximise the opportunities and to reduce the negative effects of any risk, managers need to focus on a risk management process.

Any risk can generate potential future losses, which can be significantly reduced by risk reduction measures. One of these measures is risk transfer, which according to Rejda 'means that a pure risk is transferred from the insured to the insurer, who typically is in a stronger financial position to pay the loss than the insured' (Rejda, 2008). Therefore, insurance, through risk prevention and risk reduction functions, help society to be protected against future losses.

Insurance as a simple definition represents a method used to transfer the risks to a third party (insurance company), by paying an insurance premium and, in the case of risk occurrence, the insurance company will reimburse the loss (Baiescu, 2005).

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Following the insurance definition/concept, we need to mention that as well as other principles that rule the insurance industry, the one related to mutuality is very important.

Based on the mutuality principle, all the subjects exposed to a risk/group of risks may transfer these risks to an insurance company. By paying the insurance premium, the clients contribute to the insurance company reserves that will be used to reimburse the one that will have losses (Bențe, 2004).

Worldwide, the insurance market records uneven developments, therefore, even today, most developing countries don't have a mature insurance market and the coverage for natural disasters is still limited (Arnold, 2008). Insurance companies need to develop strategies in order to become more active in these countries and to offer coverage for all types of disasters.

In this paper we will focus on catastrophic risks and measures that can be adopted in order to eliminate or minimise the negative effects of these specific risks once they occur. Catastrophic risks are considered 'rare events with major consequences' (Chichilnisky, 2009) and have usually two major characteristics: fat tails and dependence (Kousky & Cooke, 2012; Nguyen, 2013). In the last few years we have been confronted with significant catastrophic events that produced high losses, so concrete measures need to be taken by all parts involved in preventing and reducing disaster risks. Due to all these increasing natural catastrophes, the demand for specific insurance products, designed to cover this kind of damage, has increased (Hlatky, 2011).

Taking into consideration particular aspects of catastrophic risks, as presented above, insurers, who play a vital role in risk management process, must find the solutions in order to cover demand for this kind of product.

In order to face catastrophic risks, more parties (authorities, non-governmental organisations, communities, etc.) need to be involved in order to develop risk strategies.

2. Methodology

During this research we will start with the necessity and importance of the mandatory insurance for Romania, we will analyse the existing situation related to this problem. Then we will focus on the Transylvania region and analyse the impact of the catastrophic insurable risks on this area. We will analyse the role of public administration in reducing the catastrophic loss exposures.

Mandatory insurance is established by government taking into account two major aspects: (a) risk frequency and severity of the losses, and (b) social effects in case of a catastrophic event.

In order to do this, account must be taken of the map of the risks' exposure (see Figure 1).

Having a risk map, the governments of different countries must find strategies to avoid the situation of the losses that are included in the group of Low Frequency and High Severity. These kinds of losses will have a strong negative effect on people. Most of the cases (except terrorism) these losses are caused by natural catastrophes: earthquake or storms, hurricanes and their effects – floods.

Furthermore, account must be taken of the fact that hazard risks always have a negative impact. The public administrations and governments must have studies related to hazard tolerance – how much of a hazard an individual or a company can take. Unfortunately, in Romania, there were no studies for this. If we consider only rural areas, it is very possible that this tolerance is at a very low level – people do not have enough financial resources to repair minor losses.

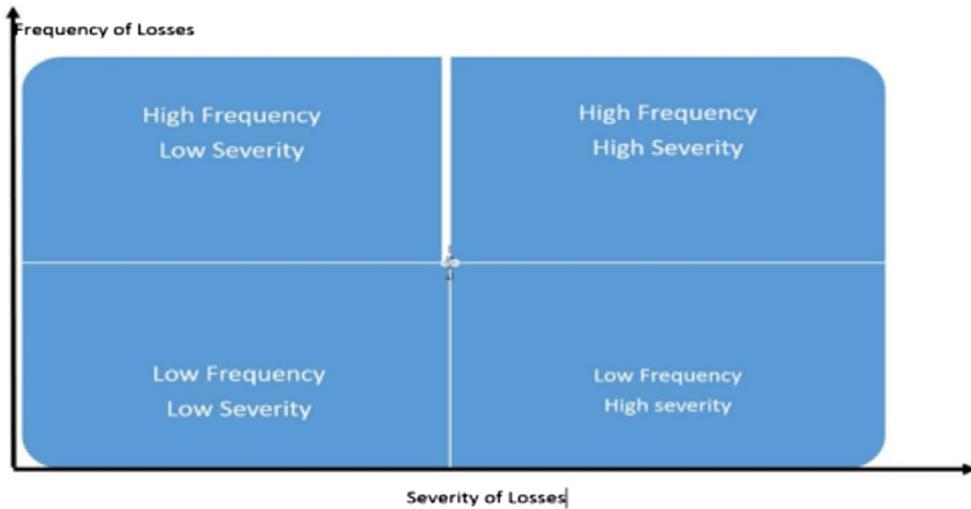


Figure 1. Risk map (based on frequency and severity). Source: Author.

Usually, in case of natural catastrophes, homeowners are the most affected. Taking into account that, for almost everyone, buying property is a long-term and expensive investment, the necessity to protect it is almost mandatory (Dorfman & Cather, 2013).

In Romania, the government decided to introduce mandatory insurance for homeowners in order to insure people against the catastrophes of earthquake, floods and landslides – Law 260/2008. Based on this Law, the Pool Against Natural Catastrophes (PAID) was set up as an insurance reinsurance company, formed by the association of 12 insurance companies. There was many years of arbitrage related to its form – needed especially in order to study different models of success in Europe. There were different prospects that suffered continuous changes. Even after 2008 when it became mandatory, it took more than two years to be applied.

The decision taken by the Romanian government is a very rational one if we relate it to the results of a Delphi method of average estimation of possible hazards: earthquakes have an average estimation of 11.1%, fire 11.4% and floods 15.6% (www.espon.eu) (see Figure 2).

According to Law 260/2008, houses are divided in two major categories, with different insured sums and different insurance premiums:

- A Class houses – building has its structure made of concrete, iron, wood and external walls made of stone, bricks or other building materials resulting from a thermic or chemical process. For these A Class houses the insured sum is €20,000 and insurance premium is €20.
- B Class houses – building has its external walls made different materials that did not result from a thermic or chemical process. For these B Class houses, the insured sum is €10,000 and the insurance premium is €10.

This mandatory insurance is supposed to be paid by all individuals and companies that have a house. Unfortunately there are many uninsured properties. If we analyse the official data provided by Natural Disaster Insurance Pool (PAID), at 31 October 2014 there were only 1,542,040 insured houses – this represents 18.13% of the total possible insurable houses.

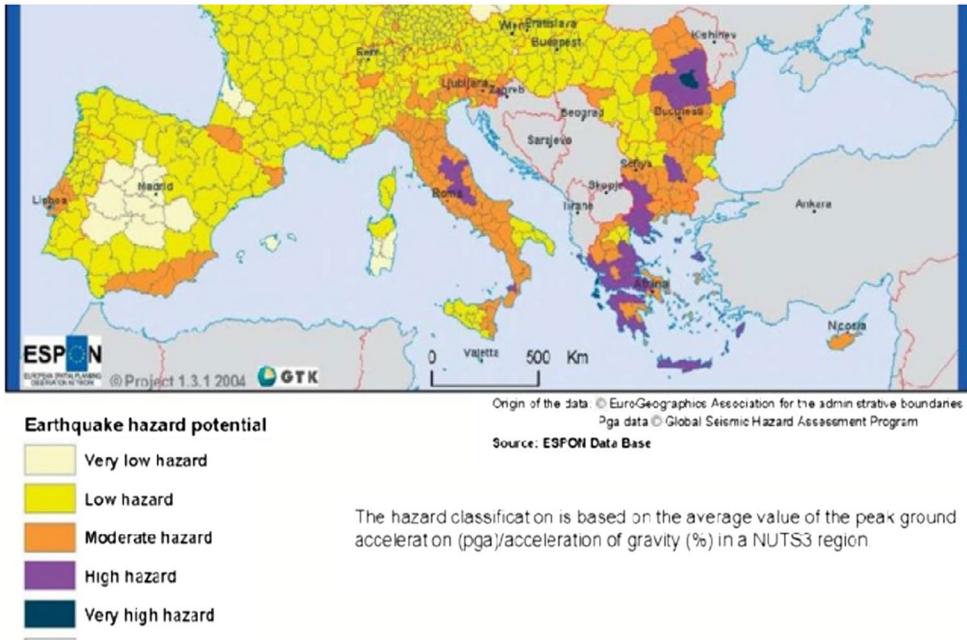


Figure 2. Earthquake hazard potential in Europe. Source: © ESPON DatabasBençe, 2004. Origin of data: ESPON Project 1.3.1., ©EuroGeographics Association for the administrative boundaries Pga Data © Global Seismic Hazard Assessment Programme. Reproduction is authorised by ESPON: (http://www.espon.eu/main/Menu_LegalNotice/).

Comparing the number of contracts to the same period (end of October of the last years) we have the following (see Figure 3).



Figure 3. PAID Insurance Contracts. Source: Author’s calculations based on Natural Disaster Insurance Pool database.

It can be observed, that since the introduction of the Law, there was an important subscribing period between October 2010 and October 2011 – there was a maximum of 845,509 contracts on 2 October 2011. Then an important decrease until the level of 200,425 contracts on 27 August 2012 was recorded. From then on, there was a significant increase, especially in the last period when the number of contracts almost tripled.

Using the data available from PAID Romania, the mandatory PAID insurance contracts from Transylvania has the following evolution – as a percentage in the total contracts in the market (see Figure 4).

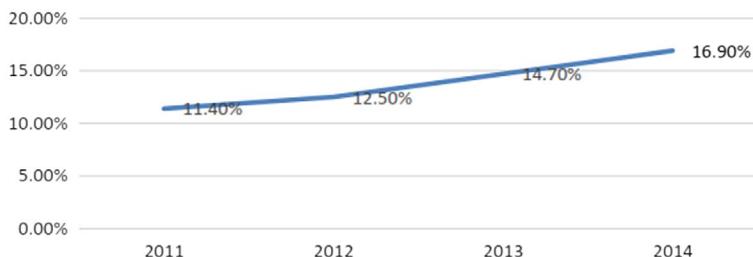


Figure 4. Influence of PAID contracts in Transylvania on PAID total contracts in Romania 2011–2014. Source: Author's calculations based on Natural Disaster Insurance Pool database.

This increasing percentage proves that the people from Transylvania are more aware of the catastrophic risks their properties are exposed to, or they are better informed about the legal requirements of the Law 260/2008 than people from other regions of Romania (except Vrancea and the surrounding counties region).

3. Research

The mandatory insurance is quite profitable at this moment for the Pool Against Natural Catastrophes. In order to determine the profit (before reinsurance payments – PAID uses reinsurance as a method of transferring a part of the catastrophic risks outside of Romania, to different reinsurance companies), we made the following assumption:

- The percentage of A class contracts in all contracts at 31 October 2014 was 89.7%, and B class contracts it was 10.3% (we will use this in order to determine the value of total insurance premiums).
- Commission for selling PAID contracts is 10%.
- All figures are in euros, we used an average official exchange rate of 4.44 Ron for 1 euro (we used the monthly averages from November 2013 to October 2014).

Transylvania, as an individual region, has an important role in this profit (see Figure 5).

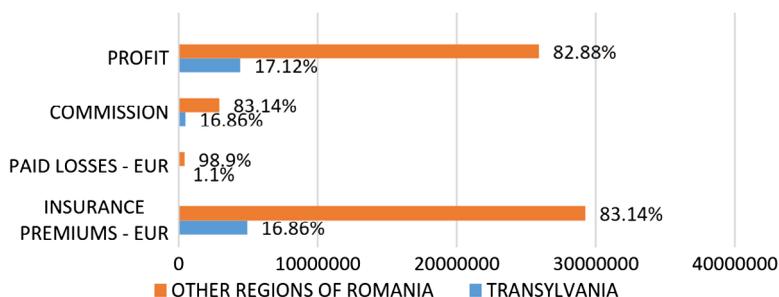


Figure 5. The influences of PAID Transylvania on PAID Romania (before reinsurance payments) in the period November 2013 to October 2014. Source: Author's calculations based on Natural Disaster Insurance Pool database.

We note that the losses caused by natural catastrophes insured by PAID contracts are insignificant as €4572 representing 1.1% of all losses was paid in Romania in the Period October 2013 to October 2014. In addition, Transylvania contributed 17.12% to the profit of PAID Romania (profit before reinsurance contracts). This fact proves that Transylvania has a very important social role in Romania – respecting the mutuality principle of insurances.

3.1. Earthquakes' issue

The profit of PAID Romania is invested in low risk financial instruments that can be easily cashed back in case of a major catastrophic event, e.g. an earthquake. Earthquakes in Romania represent a real threat and if we use the estimations of international experts from the World Bank, a possible 7.2 on the Richter scale earthquake may kill more than 1500 people, with an estimated loss between US\$7.45 and US\$17 billion (Ionita, 2012).

The most exposed area to earthquakes in Romania is Vrancea and the surrounding counties, as can be seen from Figure 6.

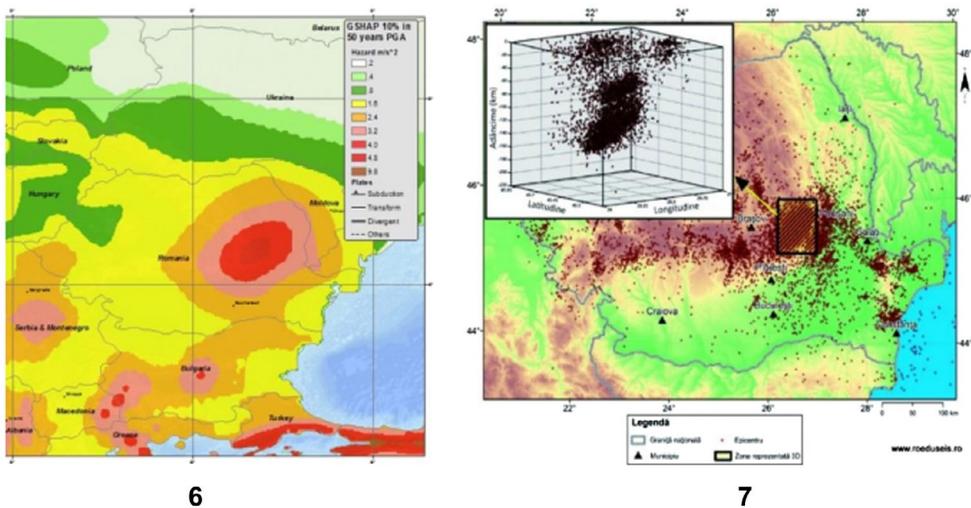


Figure 6. Earthquake exposure in Romania. Source: Wikipedia. Credit: US Geological Survey Department of the Interior/USGS. Reproduction is authorised by USGS (http://www.usgs.gov/laws/info_policies.html).

In addition, during this research, in the Vrancea region, on 23 November 2014 there occurred a 5.7 Richter earthquake – the strongest for a long period. The shockwave was felt in Bucharest, and the earthquake was followed by some minor shocks. Fortunately no loss of life occurred. This confirms that earthquakes in Romania represent a real risk.

Following this, we analysed the situation of catastrophic protection based on PAID contracts in the counties in the Vrancea area (see Figure 7).

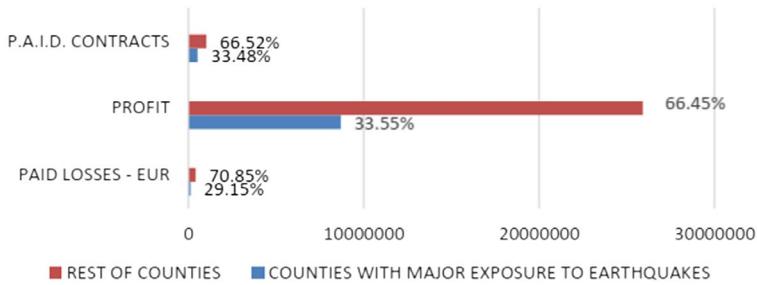


Figure 7. The influences of PAID in earthquakes exposure area on PAID Romania. Source: Author's calculations based on Natural Disaster Insurance Pool database.

Comparing this region to Transylvania we notice the following.

- PAID contracts (gross written premium) and the profit (before the reinsurance contracts) are almost double in the area exposed to Earthquakes.
- Losses that were reimbursed are much more in the counties with earthquake exposure (29% compared with 1.1% in Transylvania) – all losses occurred after catastrophic floods.

The Romanian National Institute for Research and Development related to Earth Physics takes different actions related to reducing earthquake exposure. They elaborate concrete measures for protection and also, post event, the immediate actions to be followed. In addition, there are different projects developed (e.g. NERA project: Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation).

3.2. Flood issue

Since the introduction of the mandatory insurance for house owners, PAID, the losses that were reimbursed by insurance companies were related to floods (Danuletiu, 2007). Based on the map of significant flood risk in Romania, elaborated by the National Administration Romanian Water, we note that all major rivers in Romania may generate severe losses. Romania is threatened by a combination of floods and landslides, especially in the Carpathian Mountain areas (Greiving, Tarvainen, & Jarva, 2006).

If we analyse data from the Natural Disaster Insurance Pool we can observe that the counties most affected by flooding were located in the following regions: Muntenia (Arges, Prahova, Buzau, Dambovita), Moldova (Galati, Vrancea), Oltenia (Olt, Valcea), Banat (Caras Severin, Timis). By comparison with these regions (Muntenia, Moldova, Oltenia and Banat), in Transylvania flooding was not a serious problem. The most exposed counties from Transylvania were Brasov, Harghita, Mures, Sibiu but the compensation of flood losses was at a very low level compared to the compensation provided in other regions (Muntenia, Moldova, Oltenia and Banat). This is proved by Figures 8 and 9.

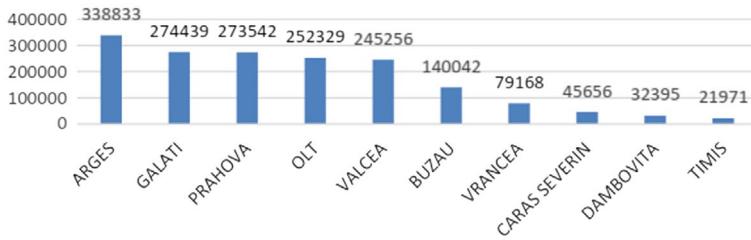


Figure 8. Top 10 counties in Romania for floods losses paid by October 2014. Source: Author's calculations based on Natural Disaster Insurance Pool database.

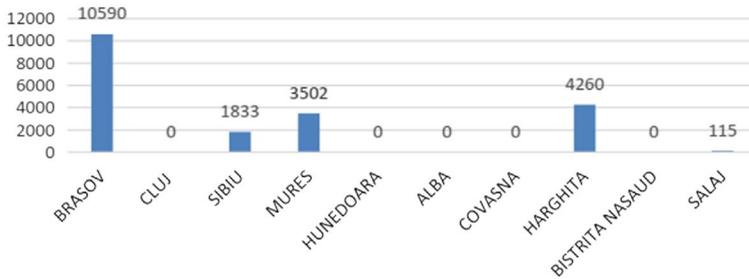


Figure 9. Flood losses paid in counties of Transylvania by October 2014. Source: Author's calculations based on Natural Disaster Insurance Pool database.

On 31 October 2014, the most severe losses occurred in Argeş County (Muntenia region). Losses recorded and reimbursed by PAID contracts only in Argeş County totalled 338,833 Ron and exceed all losses paid in Transylvania – 20,300 Ron. These losses, together with the losses caused in neighbouring counties at the end of July being so severe, received compensation from ACTAlliance Switzerland of US\$47,473.

This is an evidence for an uneven distribution of flood losses across different Romanian regions. Unfortunately it does not mean that there are no other flood losses. There are losses that are not paid because people do not have that type of mandatory insurance or are paid by facultative insurances.

Using the statistics of European Spatial Planning and Observation Network, Transylvania represents one of the places most exposed to floods in Europe (see Figure 10). So, even if currently the losses paid by the mandatory insurance are at a very low level, in the future figures may look different.

Moreover, in 2013, floods (a hydrological disaster) represented the biggest part of worldwide disasters occurrence – 48.2%, with damages of US\$53.2 billion.

Taking into account these facts, the local administrations in Transylvania must adopt efficient floods management strategies. Risk management involves two major techniques: risk control and risk financing. Risk control includes preventing measures that are very important in order to eliminate or decrease the possible effects of the floods.

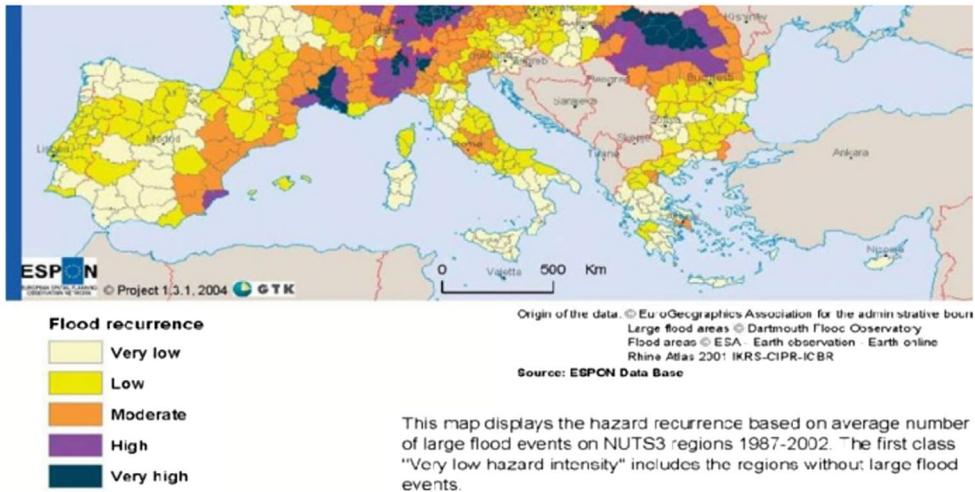


Figure 10. Flood recurrence in Europe. Source: © ESPON DatabasBençe, 2004. Origin of data: ESPON Project 1.3.1., ©EuroGeographics Association for the administrative boundaries Large Flood areas, © Dartmouth Flood Observatory Flood areas, ©ESA- Earth Observation-Earth online Rhine Atlas 2001 IKRS-CIPR-ICBR. Reproduction is authorised by ESPON (http://www.espon.eu/main/Menu_LegalNotice/).

3.3. Catastrophe risk management

A very delicate problem related to PAID mandatory insurance refers to those properties situated in rural areas and B-type houses. Using the data from PAID Romania, we can see the following evolution (see Figure 11).

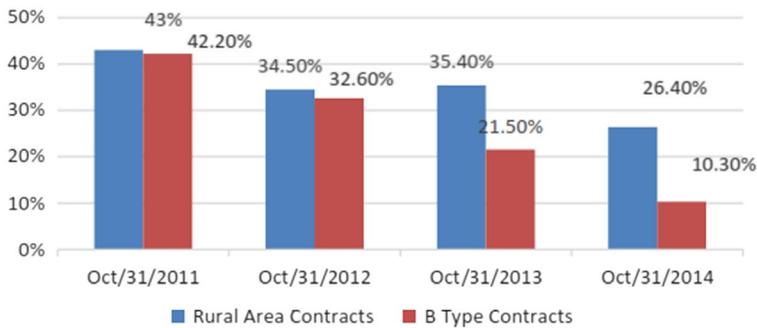


Figure 11. Percent of rural area and percentage of B-type PAID contracts in total PAID contracts – 2011–2014. Source: Author’s calculations based on Natural Disaster Insurance Pool database.

The percentage of the insured properties in rural areas decreased continuously from 43% in 2011 to 26% in 2014, and the number of contracts increased from 346,238 contracts in 2011 to 407,099 in 2014 (Natural Disaster Insurance Pool database) (after a significant decrease in the first year and then an important increase in the final year).

The percentage of the insured B-type properties decreased significant from 42% in 2011 to 10% in 2014, and the number of contracts increased from 339,797 contracts in 2011 to 158,830 in 2014 (Natural Disaster Insurance Pool database).

The most important losses caused by natural catastrophes – floods – occur in rural area because the infrastructure is weak in many places and there has been significant deforestation. With a simple deduction we assume that these rural areas are the ones that have the biggest uninsured rate (ratio between houses eligible for insurance but not insured and total houses eligible for insurance).

Rural areas have developed a lot in the few last years – many small villages that have been built up in the last few years close to major cities in Romania are still considered rural areas (see for example the Cluj Napoca area: Floresti and Baciui have a significant number of new apartments). All these are included in A Class type because they are built of concrete and bricks.

A simple mathematical formula shows that B-type houses are the most exposed houses – these are the ones that are situated in traditional rural areas where there are mostly traditional and old houses, built before 1989 (before the real estate increase). In addition, if we divide the number of B-type contracts of 2014, 158,830 (Natural Disaster Insurance Pool database) by the number of counties we have a modest average of 3873 insured houses per county.

As Transylvania has 16.9% of the total PAID contracts in Romania, it means that an average of 26,842 contracts are in Transylvania, and divided by the number of counties we have an average of 2682 contracts per county. We assume that this number is closer to reality because Bucharest has a significant number of all contracts. In addition, based on information from the National Statistical Institute of Romania, at the end of 2012 there were 12,956 villages – this means an average of 12 B-type houses insured per village or 31 insured houses per village in rural areas (we take into account that for rural concentrations close to biggest cities this number will be higher).

It does not matter whether we look at the results from rural areas or from urban areas, the percentage of uninsured houses is quite huge – 81.87% at the end of October 2014. This is less than half of the optimistic estimation of Bulucea (2009) – the General Manager in the Department of Regulatory and Authorizations for Mandatory Insurance – who estimated that in the first year of PAID subscription, the contracts will reach a level of almost 40% of total insurable houses.

These low results in subscribing may be influenced by the passive attitude of local public administrations. The Law 260/2008 mentions the fact that the mayor of each city/village, as a member of public administration, and his representatives, must note the lack of this mandatory insurance and give a fine between 100 and 500 lei.

Public authorities in Romania, unfortunately, just took note of this article in this law but they still do not act. There were no practical measures taken because of the following possible factors.

- Local/national elections – local authorities did not want to lose their possible future electors.
- There is no mention in any public administration in Romania about the level of the fine (there are no references in the law about the procedures of establishing the fine between the two levels: 100 lei and 500 lei)

- There are not enough personnel hired in the local administration to handle the fines.
- Time difference – it is very possible, when these persons from local administration send the fine to the house owners, the house owners have bought that insurance.
- There are supplementary costs related to mailing the fines to the persons that do not have this PAID insurance – this mailing must be send with a receiving confirmation. Some addresses may be different from the domicile of that person.

Beside these aspect related to public administrations, there are issues related to the insurance companies that sell PAID insurances.

- Commission for selling these PAID contracts is 10%, which means 1 or 2 euro (tax included). Anyway, the commission cannot be higher because of the lower level of the insurance premium – so insurance agents are not very comfortable selling only this contract. In addition, adding the cost of transportation to the client (in case a client would like not to attend the insurance companies' offices) the remaining balance for the agent is quite insignificant
- Time consuming: subscribing to the PAID contract takes some time to gather all requested information – so insurance agents prefer use this time to subscribe other type of insurances (with higher insurance premiums and, obviously, higher commission).
- There is a practical attitude (not recognised officially) of many insurance companies' representatives: e.g. for agents, inspectors, and agents of brokers, when a client would like to buy only PAID insurance, the client is told that that can buy it only together with facultative house insurance.

The real problem of this lack of underwriting refers to rural areas – the most exposed area to natural catastrophes – if we judge only flood areas in most regions of Romania. The causes of this low number of contracts may be as follows.

- There are no subsidiaries of any insurance companies in the most areas and will never be.
- Insurance representatives will not go there because the costs for transport in these area are much more than in urban areas.
- Lack of information, no marketing actions were taken neither by PAID Romania nor by the insurance companies – many of the owners of the houses in the rural are do not have any idea about this mandatory insurance.
- The requirements of underwriting this insurance requires access to the internet (insurances' companies platforms) and a portable printer – no insurance representative will do this for a small financial earning.

In Transylvania, the problems related to possible floods include the following major hydrographic areas: Somes-Tisa, Cris, Mures, Olt (in the Transylvanian region). All these hydrographic areas took advanced risk management measures. These measures refer to: protection strategies in order to avoid losses caused by floods and also limitation of losses – in case floods still occur.

In the Transylvania hydrographic area, there are efficient measures that have been taken that involve the hydro technic projects of: embankments, regularisations, accumulations. By these measures, the purpose of local administrations is to mainly protect all rural and urban areas. Using different Flood Warning Systems (EAST AVERT, WATMAN, etc) local

authorities responsible for emergency situation are able to established warnings/alerts for different exposed area to possible floods threats. For example when Danube experienced severe floods in Europe in 2013, the Romanian authorities had the possibility to take urgent prevention measures in order to control the Danube’s flows – especially controlling flows of other major rivers that flow into the Danube. Having these tools available, the water is efficiently managed and the flows of the major rivers Somes-Tisa, Cris, Mures, Olt continuously monitored. A National Project DESWAT (Destructive Water Abatement and Control of Water Disaster) was developed that was designed for modelling hydrological issues and realising a forecasting system. Being a monitored hydrological system for all medium and large-scale water basins, real time flood forecasting can be developed in order to reduce flood impacts.

All these measures are taken by local authorities respecting the requirements of Romanian Government Decision no. 846/2010 for the Approval of the Medium and Long Term National Strategy for Flood Risk Management (2010). This Government Decision was established in concordance with Directive 2007/60/CE of the European Parliament and Council. Supplementary requirements include: restrictions for building houses in exposed areas, maintenance of existing infrastructures, informing the population about individual measures that must be taken in order to prevent/limit losses in case of floods.

While all these projects are for major rivers, there are some significant losses caused by minor rivers that occasionally have excesses of water caused by heavy rains and deforestations. The first of these cannot be prevented, but the second represents an actual problem that is very hard to manage because there is still lot of illegal deforestation.

Further, following a study from 2006 – Flood Risk in Europe (Lugeri, Genovese, Lavallo, & De Roo, 2006) – we can see that Romania is the second country, after Bulgaria, with a High Level of Hazards in Construction Sites (see Figure 12), especially because of urban developments outside of major cities. Many constructions were approved to be built in area with flood exposure or in areas without studies related to this risk.

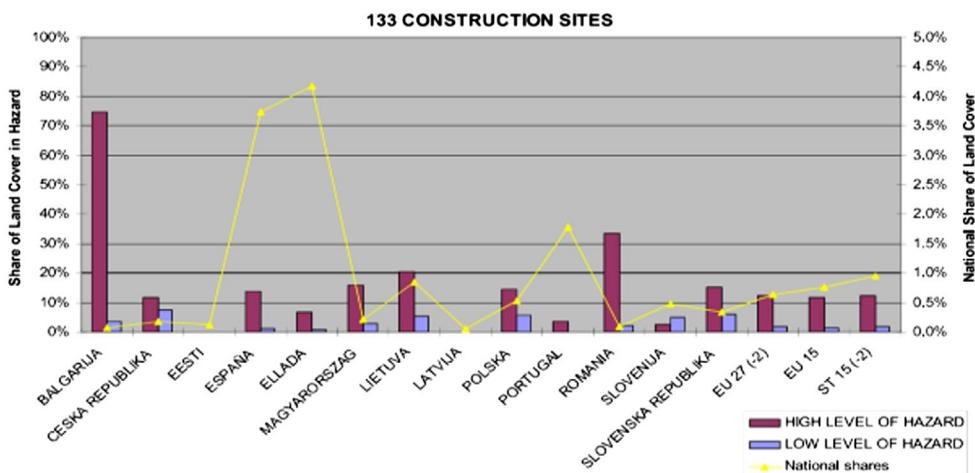


Figure 12. Share of land cover in flood hazard – 133 construction sites. Source: Flood risk in Europe: analysis of exposure in 13 countries (Lugeri et al., 2006). Reproduction is authorised provided the source is acknowledged.

Public authorities need to work together with all other entities involved in floods management and establish actual maps of hazards.

Based on the estimation of Swiss Re. (2014) up to 65% of the climate losses in the future (this includes floods) can be averted by using cost-effective measures. This means that public authorities must invest significant financial resources in order to have efficient warning measures.

Public authorities must have a strong involvement in the prevention stage. It is very easy to take prevention measures instead of post event measures. Authorities must act together with insurance companies – both have an interest of having a low level of losses in case of floods.

- Public administrations will have fewer financial resources to advance for social cases and infrastructure repairing.
- Insurance companies will have fewer losses to reimburse, and the profit on this type of insurance may be higher.

Acting together in the prevention stage, insurance companies may offer public administrations different statistics related to the severity of compensated losses in a given period, and vice versa.

In addition, a suitable flood risk management plan must be set up by interconnections between infrastructure, public administrations, private companies and individuals – each part needs to know precisely its role in preventing measures and post-event actions (Jonkman & Dawson, 2012). Having these roles established, the losses may be minimised. They can work together in order to:

- give detailed information about natural catastrophe risk to all property owners situated in risk areas in order to limit losses (International Federation of Red Cross & Red Crescent Societies, 2011).
- have planning rules in order to limit or to prohibit development in high risk areas. If authorities cannot limit development in already built areas, they can establish mandatory restrictions for development high risk areas. These restrictions may be imposed by national land use legislation, construction law, by government or by local authorities. They will be able to limit losses in case of natural catastrophes.
- educate the population in risk areas. We live in times of increasing vulnerability to extreme natural hazards. Losses can be limited if population know how to react in the case of natural catastrophes – see Public awareness and public education for disaster risk reduction: a guide (Kuberan, 2007; Nathe, Gori, Greene, Lemersal, & Mileti, 1999; Petal, 2007; Sayers, 2006).
- Provide a framework to allow the transfer of knowledge between international insurers and local insurers related to the problem of catastrophe losses (King, 2013).
- Promote actions that strengthen communities against losses from natural disasters (International Federation of Red Cross & Red Crescent Societies, 2011).
- Direct the infrastructure investments to low risk areas (Arcadis, 2014; European Commission, 2014).
- Develop early warning systems in order to reduce economic losses and decrease the number of injuries or deaths in the case of an impending natural disaster. The system

will allow communities to take action and respond before a disaster strikes (Pearson, 2012; Zschau & Küppers, 2003).

To be operative and to produce the maximum effects, all these measures need to be included into policies to disaster mitigation. All these measures are intended to reduce the chances of developing catastrophic risks or to limit unwanted effects (damage and casualties) in the case of any catastrophic event.

4. Conclusion

Catastrophic risks in Romania represent a real threat for individuals, companies and public entities. The Romanian government has tried to help building-owners from the financial consequences of these negative events. A decent level of €20,000 or €10,000 was chosen as the insured sum for each property. In economic terms, this amount will be not sufficient to repair the damage in case of a major or a total loss occurring to a building. However, it allows to owner to repair or to advance some money for a future building. Both individuals and companies have an extended option available in the insurance market – facultative insurance, in case someone wants full protection of the building against these catastrophic risks.

Right from the beginning, a very important point must be understood: transferring catastrophic risks to a third party is not a solution to all involved parts. This is why, for facultative insurance, some insurance companies introduced a deductible for catastrophic risks (A deductible is the amount of money an individual pays for expenses before his insurance plan starts to pay. See: <http://www.investopedia.com/terms/d/deductible.asp>) (especially earthquakes). As a component of a risk management plan, controlling the risks is a very important stage. Prevention must be the primary target for public administrations and other state or private entities (or in some area even on behalf of individuals). Prevention may be related to embankments, reforestations, actual detailed maps of risk exposure (maps that may be continuously updated), water flows controlling, real time warnings, and so on.

Beside this sophisticated measures, the following simple actions there should be done: organising courses and seminars related to prevention measures and acting measures in case of a catastrophe (all public and private entities – starting from the kindergartens and schools), and elaborate and distribute specific materials/brochures in the most exposed areas.

Together with these courses/seminars for people and for public and private entities, there should be specialised courses in catastrophe risk management for the involved and responsible persons. There should be emphasised the latest tools and techniques available in managing catastrophic risks, the practice of catastrophe risk management, usage the different models for risk management, the role of uncertainty in evaluating catastrophic risks, the vulnerability of exposing people and private or public entities, and during and post-event actions.

Social aspects after a catastrophic event must be also considered. Local and national administrations must have applicable protocols in these cases, with urgent access to all resources in order to satisfy the basic needs of the affected people.

In addition, local and national public administrations may take into account different models to measure vulnerability to floods. For example, there was a successful model used only in Banat, a model that refers to rural area – as the one most exposed to this type of

catastrophic losses. This model – the IGAR-VULMIN project – took into account flood exposure (severity and probability), socio-economic and ecological vulnerability. It could be developed and extended to each region of Romania. For this to happen, there is need for significant financial resources – local administrations can cooperate with state entities (IGSU, National Administration Romanian Water) in order to elaborate different projects that can be financed by the European Union.

Public administrations' representatives need to start penalising persons that do not pay the mandatory PAID insurance. In this way, there might be enough financial resources for a natural catastrophe. Or, in case of this penalisation (the fine costs more than the insurance itself), there may be introduced another way of subscribing and collecting insurance premiums. Based on the fuel price that includes a tax for developing road systems in Romania, a pertinent measure may be to introduce this mandatory insurance in the amount of property tax that must be paid every year. In this way, the National Fiscal Administration – ANAF will collect this amount and then will transfer it to PAID Romania. Using this strategy, the percentage of insured properties with regard to the total insurable properties will reach a very high level.

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