

## Possibilities of forest property insurance against the risk of fire in Slovakia

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**Abstract:** Fire is considered one of the major natural hazards that damages European forests and causes losses for forest owner. The forest fires endanger the financial stability of forest enterprises, which may cause their economic decline. One possibility how to cover these losses is to insure forest land against this kind of specific risk of forest land management. The aim of the present paper is to analyse possibilities of forest fire insurance for forest owners and enterprises in the Slovak private insurance market. The market analysis was based on document analysis of general terms and insurance conditions of chosen private insurance companies and interviews with insurance agents. The results show that forest owners and enterprises have only few options for forest property insurance concerning the specific risk of forest fires. Only one commercial insurance company provides such forest fire insurance product for forest owners. This insurance covers material damage to forest land and timber damage.

**Keywords:** forest fires occurrence; risk of forest management; commercial insurance companies

More frequent heatwaves, droughts and storms are considered as important abiotic and biotic risk (stress) factors for forest growth (Krawchuk et al. 2006; Vido et al. 2016). These risk factors negatively affect the possibilities of forest land management (Holécý, Korená Hillayová 2020) and are known as specific risks of forest land management (Strange et al. 2014). One of the significant specific risks of forest land management is the occurrence of forest fires (Kouba 2002). Forest fires damage single trees as well as whole forests, which is associated with the risk of failure to meet the economic objectives of forest management planning (Neary et al. 2005; Holécý, Korená Hillayová 2020).

Despite the fact that forest fires are not the most common causes of forest project failures in Slovakia, they are largely threatening people's lives and have serious environmental and economic consequences (Brunette et al. 2015). The restoration after intense wildfires is an expensive practice for forest owners (Barreal et al. 2014). As reported by Seidl et al. (2017), globally the most destructive natural elements in forestry are forest fires, within Europe mainly in the Mediterranean area (Oliveira et al. 2012). This risk increases especially on dry sandy soils (Gömöryová et al. 2013; Lindner et al. 2014; Feurdean et al. 2017), moreover, greenhouse gas emissions from forest or land fires still repre-

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sent an important part of the greenhouse gas emissions from the forestry and other land-use sector (Korísteková et al. 2020). The occurrence of forest fires also endangers the financial stability of forest enterprises, which may cause their economic decline (Holécý, Hillaýová 2020). These financial problems cannot be fully covered from the state budget and supports (Holécý, Hanewinkel 2006). To address this problem forest enterprises put increasing emphasis on programs about fire prevention (Brunette et al. 2010). Another possibility how to stabilize the financial situation of forest enterprises and diversification of forest fire risk is forest property insurance against this specific risk (Holécý, Hanewinkel 2006; Brunette et al. 2015). Forest restoration is expensive for forest owners who may be interested in covering forest fire losses with insurance in exchange for the payment of an insurance premium (Barreal et al. 2014).

The assessment of the risk of forest fires currently becomes a discussed issue for the insurance market. Estimates of the likelihood of damage can be made based on risk models (Brunette et al. 2015). There are currently theoretical insurance models that involve a specific risk of forest land management (Holécý, Hanewinkel 2006). Thus, covering and absorbing the economic consequences of forest fires remain an important issue (Lindner et al. 2010).

Starting from this point, the goal of this paper is to analyse the supply of forest property insurance against the risk of fire on the Slovak insurance market. We analysed the offered product portfolio

of non-life insurance products of commercial insurance companies focused on insurance of the specific risk of forest land management.

## MATERIAL AND METHODS

We conducted the market research focused on the product portfolio of commercial insurance companies with the goal to map out the options in forest property insurance. Firstly, we made the list of insurance companies operating on the Slovak insurance market (Table 1). Secondly, we described them according to two main variables, namely annual sales and the kind of insurance products offered. In Slovakia, we have 19 commercial insurance companies. Thereof six are the foreign branches of supranational insurance companies' groups.

The next step of the research was to classify all companies based on chosen variables (Figure 1). We selected a sample of commercial insurance companies based on their annual sales for the year 2019. The data for economic analysis was provided by the online economic database available on [www.finstat.sk](http://www.finstat.sk). The database provides daily updated financial data of Slovak companies that have published their reports at least once per year. The process of selecting commercial insurers was based on the selection of enterprises from the finance sector and the subsequent selection of commercial insurance companies according to the number of sales in descending order. For purpose of the study, we selected the first five commercial

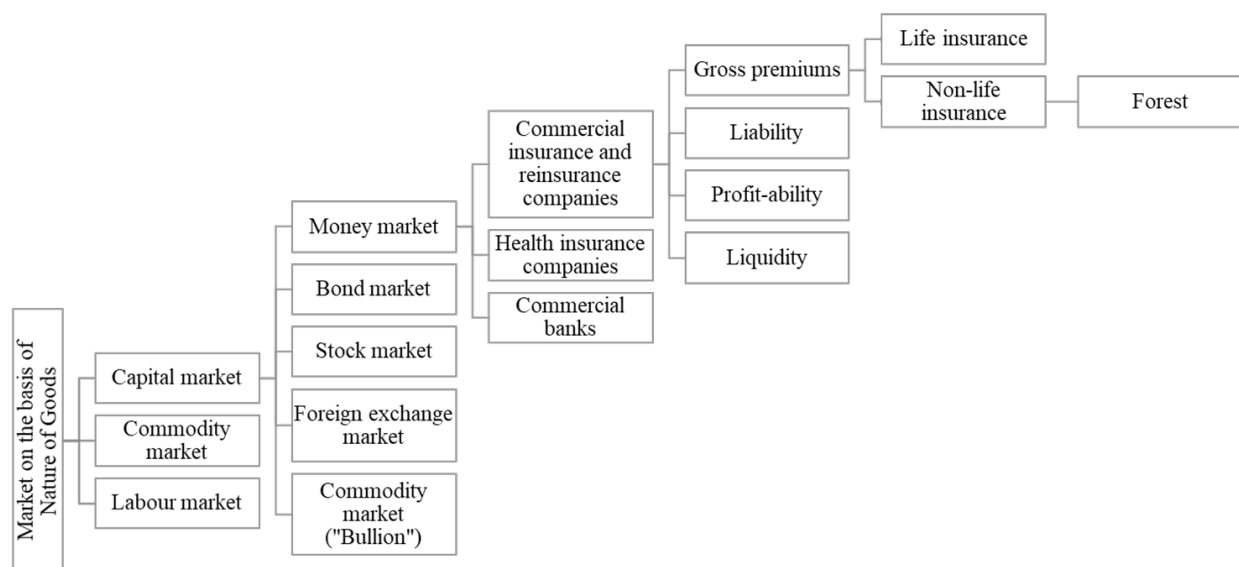


Figure 1. Decision diagram – choice of insurance companies

Table 1. List of commercial insurance companies on the Slovak insurance market

Insurance company/ branch of a foreign insurance company	Web address	Gross written premiums (2019)	Total income (2019)	Insurance products
		(EUR)		
AEGON Životná poisťovňa, a.s.	www.aegon.sk	–	4 780 000	life, non-life
Allianz – Slovenská poisťovňa, a.s.	www.allianzsp.sk	645 902 000	85 684 000	life, non-life
AXA životní pojišťovna a.s., branch of a foreign insurance company	www.axa.sk	82 624 726/ from total 140 876 141**	17 929 078*;**	life
BNP Paribas Cardif Poisťovňa, a.s.	www.bnpparibascardif.sk	36 124 626	1 367 000	life, non-life
ČSOB Poisťovňa, a.s.	www.csobpoistovna.sk	93 682 000**	223 657	life, non-life
Generali Poisťovňa, a.s.	www.generali.sk	257 703 000	10 165 000	life, non-life
NN Životná poisťovňa, a.s.	www.nn.sk	52 336 000	5 420 000	life
MetLife Europe d. a. c., branch of a foreign insurance company	www.metlife.sk	–	–	life
KOMUNÁLNA poisťovňa, a.s., Vi- enna Insurance Group	www.kpas.sk	108 699 000	1 106 000	life, non-life
KOOPERATIVA poisťovňa, a.s., Vienna Insurance Group	www.kooperativa.sk	292 040 220	36 486 000	life, non-life
Poštová poisťovňa, a.s.	www.ppabk.sk	16 967 000	3 341 000	life, non-life
Union poisťovňa, a.s.	www.union.sk	64 267 000	–1 306 000	life, non-life
UNIQA poisťovňa, a.s.	www.uniqua.sk	126 161 000	3 277 000	life, non-life
Wüstenrot poisťovňa, a.s.	www.wuestenrot.sk	54 969 000	2 724 000	life, non-life
AXA pojišťovna a.s., branch of a for- eign insurance company	www.axa.sk	36 737 917/from total 104 661 603**	6 598 945*;**	non-life
BASLER Sachversicherungs-AG, pobočka poisťovne z iného členského štátu	www.baslerpoistovna.sk	–	6 457 183***	life
Colonnade Insurance S.A., branch of a foreign insurance company	www.colonnade.sk	23 332 000/from total 162 506 000	7 985 000*	non-life
Groupama poisťovňa, a. s., branch of a foreign insurance company	www.groupamagarancia.sk	7 997 904***	–1 191 689	life, non-life

\*consolidated income statement; \*\*converted according to the daily exchange rate list from 31.12.2019; \*\*\*references for 2017 year

insurance companies with the highest annual sales volume within the period under review.

The analysis of insurance products provided by selected insurers was based on document analysis of General Business Conditions and Insurance Contracts of Selected Insurance Companies. As reported by Bowen (2009), documentary evidence is often combined with interview and observation data to minimize shortcomings and increase the reliability of the observed information. Moreover, we collected used standardized open-ended personal and telephone interviews with sale representatives of the insurance companies. The interview

itself was preceded by conscientious preparation, which included the following activities (Fontana, Frey 2005):

- Clear formulation of the problem – setting the research question: What possibilities do forest owners/managers have concerning forest property insurance in case of the risk of forest fire?
- Sampling of respondents – insurance agents of selected commercial insurance companies listed in their official web addresses.
- Choosing the type of interview and setting the time of data collection – standardized interview conducted during autumn 2019.

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Table 2. Number of forest fires in Slovakia in the years 2009–2018

Year	The volume of incidental felling (m <sup>3</sup> )	Number of forest fires	Damaged area (ha)	Estimates cost of damaged area (EUR)
2018	70	262	248	436.140
2017	4.830	162	298	410.330
2016	2.363	136	175	96.665
2015	1.183	242	353	367.370
2014	1.866	153	192	142.445
2013	3.395	233	270	270.230
2012	8.287	517	1.683	793.860
2011	1.870	303	403	577.070
2010	9.000	123	192	346.600
2009	1.101	347	510	708.800
Total	33.965	2.478	4.324	4 149.510

Formulation of open-ended questions:

- Do you distinguish forest enterprises as a separate group of business units to provide commercial insurance products in general?
- Do you offer commercial insurance products for forestry enterprises to insure the specific risk of forest fires? If yes, please specify.
- Is it possible to create such a “tailor-made” commercial product by underwriting (upon the special request)?
- Screening and refining issues through the pre-research – pre-test of the interview with an insurance expert.

An interview with insurance agents was conducted to compare which insurance products focused on forest fire risk they can offer even if this kind of risk insurance is not included in their commercial offer. After comparing information about forest fire risk insurance possibilities (supply) obtained through the document analysis and interviews with insurance agents we prepared an overview of insurance products for forest owners.

## RESULTS

Forests cover 41.2% of the Slovak land, which represents 2.019 million ha of the forest land (Ministry of Agriculture and Rural Development 2019). Forests in Slovakia are endangered by many natural hazards, for example storm, snow, insects, fire. Based on the statistical data on forest fire occurrence from Databases of National Forest Inventory, obtained from the Fire and Technical Experts Institute of the Ministry of Interior of the Slovak

Republic and the National Forest Centre in Zvolen, about 2 478 forest fires were registered in the territory of the Slovak Republic in the period 2009–2018, this represents 4 324 ha of damaged forest land. The estimated cost of damage caused by forest fires in that period reached up to EUR 4 149 510 (Table 2). Furthermore, the current climate models predict the increased frequency of extreme climate events that will result in temperature increases and droughts (Rajczak et al. 2013).

The results of the insurance market analysis in Slovakia focused on the possibilities of damage insurance due to forest fires point to the lack of insurance products for forest enterprises (Table 3).

Document analysis focused on general agreements of insurance companies shows that forest enterprises are not recognized as separate categories of enterprises within the insurance companies and their internal enterprise categorization. The four biggest insurance companies in Slovakia categorize forest enterprises according to their size. Only one of the chosen commercial insurance companies (Uniq poistovňa, a.s.) registers forest enterprises in a special group. This special categorization based also on the production field is a very common practice in the case of agricultural enterprises (Smith, Glauber 2012).

The next step was to analyse the commercial products of insurance companies. We analysed their product portfolio with the goal to find the commercial products for forest enterprises against the risk of forest fires. Also, in this case, we found out that the four biggest Slovak insurance companies do not have such products for forest enterprises. The in-

Table 3. Insurance companies related to the study

Commercial insurance company	Category of forest enterprises	Specified insurance product: „Insurance of forest against the risk of forest fire”	
		commercial insurance product	insurance product based on special agreement/underwriting
Allianz - Slovenská poisťovňa, a.s.	small and medium enterprises; general category	no	yes
Kooperativa poisťovňa, a.s.	small and medium enterprises; general category	no	no
Generali Poisťovňa, a.s.	small and medium enterprises; general category	no	yes
Komunálna poisťovňa, a.s. Vienna Insurance Group	small and medium enterprises; general category	no	no
Uniqa poisťovňa, a.s.	small and medium enterprises; forestry	yes	yes

insurance agents of two insurance companies offered to us a possibility to negotiate this kind of risk insurance with contacts on the head of the department of non-life insurance products. He informed us about the possibility of a “tailor-made” risk insurance product via the underwriting department. Underwriting is used for insurance policies that accept large insurance risks (Wertheimer 2006). The Company concludes contracts that transfer the risk from the client to the Company, in case of insurance claim. Underwriting is a special process by which an insurance company determines under what conditions an insurance product proposal can be accepted. Underwriting risk (including insurance risk, technical provisions risk, lapse risk, and infection risk) is defined as follows: (i) the risk of loss or of adverse change in the value of insurance liabilities due to fluctuations in the timing, frequency, and severity of insured events, and in the timing and amount of liquidated damages and (ii) the risk of loss or adverse change in the value of insurance liabilities due to a significant uncertainty in pricing and estimating reserves in the event of extreme or exceptional events. If the forestry enterprise is interested in forest insurance against the risk of forest fire, the sequence of processing the proposal to conclude an insurance contract is as follows:

The product advisor, employee of the insurance company or insurance agent, fills in the electronic “requirement note” with the forest owner or manager of the forest enterprise. This “note” contains basic information about the insured forest land

and forest enterprise (e.g., acreage of the forest land, capital value of the forest land, damage events for the last decade, basic financial indicators of the enterprise). Based on the requirement note sent to the note sent to the specialised department, the underwriting process is carried out to assess the insurability of the company in the case of specific risks of forest fire. The output of this phase is the underwriting report. This is followed by the approval or rejection of the insurance contract proposal according to the internal processes.

The insurance agent from “Komunálna poisťovňa, a.s. Vienna Insurance Group” told us that they do not offer this kind of forest fire risk insurance under any conditions. As a result of the interviews, we can conclude that it is not an economically attractive field for the insurance market. A respondent from “Komunálna poisťovňa, a.s. Vienna Insurance Group” insurance company stated: “The insurance contract for such a high risk requires high insurance annuity, furthermore the owners are not willing and able to pay it.” A respondent from “Kooperativa poisťovňa, a.s.” revealed that “this kind of catastrophic risk, like many big risks in natural environment, is not profitable for us, thus it is not interesting at all”.

According to the Slovak associations of insurance companies (“SLASPO”) Allianz – Slovenská poisťovňa, a.s., and Generali poisťovňa, a.s. are preparing a commercial insurance product “The forest property insurance” that will cover also harms caused by forest fires.



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The Uniqua, LTD. insurance company provides specialised insurance products for forest enterprises called “Insurance of the Forest”.

The insurance covers:

- Forest stands that are objects of the insurance contract, location of these stands is described according to their identification by the Geodesy, Cartography and Cadastre Authority of the Slovak Republic (parcel number, forest, and hunting unit),
- Timber harvested from contracted forest stands, which is located on the felling area, in the wood yard, in the forest, or on agricultural land or during transport within Slovakia.

The insurance applies to productive forests. Based on the underwriting process, it is possible to insure also protective and special-purpose forests, without calculation of the profit. Compensation is always accounted related to the usual valuation methods valid in forestry. In case of total damage to stands, the insurance company will reimburse the afforestation/reforestation costs. According to the documents, these represent the costs of primary afforestation up to 15% of the maximum value of the guarantee per ha, which are considered as insurance premiums. The loss will be compensated depending on the age of the forest stand. In the case of damage to uneven-aged and old-aged stands, the insurance company will compensate the expected loss of growth because of incidental felling. In case that the occurrence of loss event causes accidental felling, the insurance covers the minimum return on the sale of timber or, in the case of total damage, the economic value of the stands. As an example, we mention the insurance contract between the company and forest enterprise “Mestské lesy Košice a.s.”. The insurance agent of the Uniqua insurance company stated that the above-mentioned forest enterprise insured 661 ha of forest land, while its insurance premiums were 4.191 euros per year. As he clarified, the forest area, tree species, and growing stock per ha were considered in the premium calculation.

## DISCUSSION

The assessment of the risk of forest fires is a discussed issue for the insurance and reinsurance market (Smolka 2006; Mills 2007). Estimates of the probability of damage can be made based on risk models (Holécý, Hanewinkel 2006; Brunette et al. 2015). An important task of an insurance company is to as-

sess risks concerning its solvency. The solution of this issue begins with statistical modelling of the number of individual receivables (Brunette et al. 2015).

The results of the study show that there is a lack of possibilities on the Slovak insurance market for forest owners to insure their property against the forest fire risk. There are several reasons there (Holécý, Korená Hillaiová 2020). Hanewinkel et al. (2011) identified one main problem based on a simple economic theory: low demand on the side of forest owners, due to the predominant risk-aversion of their forest managers (Brunette et al. 2017) and on the other hand, low supply on the side of commercial insurance companies. As Mills (2007) stated, the main recommendations for insurance companies to develop new insurance products for forest owners are: (i) to improve loss data collection and analysis; (ii) to engage in weather/climate research and modelling and (iii) to analyse implications of climate change on underwriting, investments, and customers.

A similar situation on the insurance market is also in Europe. As Brunette et al. (2010) observed, the insurance market strongly varies across the European countries. Even, in some European countries such as Greece where fire during summer is a critical issue, there is no private insurance. For example, in Denmark and Sweden, more than 60% of forest owners are insured against storms whereas insurance is not a current practice in France and Germany. Consequently, the forest insurance market in Europe is heterogeneous in terms of supply and demand. This heterogeneity can be explained by public interventions observed in different countries. Unlike the risk of many other disasters, forest risk insurance against fire is frequent mainly in the Mediterranean area (Pinheiro, Ribeiro 2013), where the forest fire risk is considered a major hazard (Oliveira et al. 2012). In the Czech Republic, there are two insurance companies that offer insurance services to forest owners. Furthermore, The Support and Guarantee Farm and Forestry Fund provides financial support to Czech forest owners and other entities operating in forestry in the form of securing investment loans, direct provision of investment and operating loans, reducing interest burden on investment loans and insurance support (MZe 2017).

Forest insurance issues are among the most difficult issues that forest owners and managers must deal with. There is still an urgent need to inform

them about this topic. For example, in Germany, the Federation of German Forest Owner Associations (Arbeitsgemeinschaft Deutscher Waldbesitzerverbände e. V.) was established in cooperation with AXA Insurance Company German Forest (VSDW) as a new competence centre for forest owners and a central focal point for all aspects of risk protection. It provides comprehensive information, specific solutions, and tailor-made insurance. Following the establishment of the German Forest Insurance Agency, forest owners in Germany have managed to establish a central contact point for risk and insurance issues, in particular about storms and forest fire hazards due to changing climatic conditions. The insurance covers forest fires, forest storm insurance, owner liability insurance, property liability insurance, environmental damage insurance. The development of similar associations within other European countries could help forest owners to better understand the opportunities that arise from forest property insurance.

## CONCLUSION

Forest fire risk has been increasing over the last years. This specific risk occurrence has a strong negative impact on the health of forest ecosystems and the financial stability of forest enterprises. Forest property insurance is one of the possible measures to effectively address the specific risk of forest land management and how to eliminate it from forestry projects. The authors of the paper mapped out the supply of forest property insurance against the risk of fire under Slovak conditions. We analysed the product portfolio of non-life insurance products of the biggest commercial insurance companies through document analysis and interviews with agents of chosen insurance companies on the Slovak insurance market. The results show that forest owners have limited insurance possibilities in the case of forest fire risk. Only one insurance company provides commercial insurance products focused on the risk of fire to the forest enterprises. Other two insurance companies mentioned other ways how to offer this kind of product – by using underwriting, the special process of negotiating an agreement between forest owner and insurance company.

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