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Димніч О.В.

к.е.н., доцент кафедри страхування
ДВНЗ «КНЕУ імені Вадима Гетьмана»
проспект Перемоги, 54/1, Київ, Україна
e-mail: dymnichov@kneu.edu.ua
ORCID: 0000-0002-4532-8742

Гаманков Д.В.

к.е.н., голова департаменту андерайтингу та
методології морських та авіаційних ризиків
ПРАТ «Страхова компанія Українська страхова група»
e-mail: gamankov@gmail.com
ORCID: 0000-0001-5466-2382

ЗМІНИ НАВКОЛИШНЬОГО СЕРЕДОВИЩА: АНАЛІЗ ПОТЕНЦІЙНИХ ВИКЛИКІВ ТА МОЖЛИВОСТЕЙ ДЛЯ УКРАЇНСЬКИХ СТРАХОВИКІВ

Dymnich Olha

PhD in Economics, Associated Professor at
KNEU named after Vadym Hetman,
Peremohy avenue, 54/1, Kyiv, Ukraine
e-mail: dymnichov@kneu.edu.ua
ORCID:0000-0002-4532-8742

Gamankov Dmytro

PhD in Economics, Head of the Department of
Underwriting and methodology of
marine and aviation risks,
PJSC «Insurance Company «Ukrainian Insurance Group»,
Kyiv, Ukraine
e-mail: gamankov@gmail.com
ORCID:0000-0001-5466-2382

EXTERNAL ENVIRONMENTAL ISSUES: ANALYSIS OF THE POTENTIAL THREATS AND OPPORTUNITIES FOR UKRAINIAN INSURERS

Анотація. Природні лиха завжди залишаються такими, що мають найнесподіваніший вплив на збалансованість розвиток світового господарства. Передбачити та запобігти подібним подіям надзвичайно важко, тому страхування від таких ризиків стає все поширенішим інструментом боротьби з ними.

Окремі роки виявляються вкрай несприятливими щодо впливу природних умов. Саме в такі моменти переважна більшість населення замислюється про необхідність страхування, яке в подібних ризиках підтримується за рахунок світового ринку перестрахування.

Згідно зі звітом Швейцарського перестрахового товариства Swiss Re, глобальні збитки від застрахованих природних катастроф у 2018 р. досягли 85 млрд доларів. Економічні втрати від природних та техногенних катастроф у 2019 р. склали близько 140 млрд дол.; глобальні страхові збитки в 2019 р. оцінюються приблизно в 56 млрд дол.

Разом з тим страхове покриття подібних ризиків навіть на світовому рівні залишається недостатнім: страховими та перестраховувальними компаніями було покрито лише 30 % збитків.

Захист населення та територій від стихійних лих у даний час залишається дуже актуальною проблемою. Вона пов'язана із щорічним збільшенням кількості природних катастроф, що виникають, та їх інтенсивністю.

Як зазначено у Програмі розвитку ООН від 2011 р., населення в менш розвинених країнах із нижчим показником людського розвитку більше страждає від стихійних лих.

Попередній 2019 р. в Україні ознаменувався природними явищами: шквальним вітром, градом, сильними грозами та спекою. Варто також зазначити, що спалювання сухої трави та деревини вже стало майже стихійним лихом: кожної весни в Україні палають десятки і сотні гектарів.

У той же час не меншої згуби приносять повені. В останні роки повені на Закарпатті стали найпоширенішим природним лихом, що спричиняє катастрофічні матеріальні збитки, іноді з людськими жертвами. Їх причиною, за думкою експертів, є не лише природні, але й людські фактори, в першу чергу, вирубка лісів.

Україна належить до групи «менш розвинених країн», тому виникнення різних стихійних лих завдає значної шкоди її економіці та добробуту населення. Природні явища, такі як повені, хуртовини, урагани, землетруси, лісові пожежі, морози, град тощо, знищують майно за дуже короткий час.

Наразі питанням недопущення та подолання наслідків стихійних лих і їх вплив на населення країни повинні займатися не тільки на державному рівні, повинно відбу-

ватися активне залучення українських страхових компаній, які на даний час стикаються з широким колом проблем при наданні послуги страхування майна: починаючи від слабо розвинутого ринку перестраховування й до відсутності системного підходу до самої проблеми.

Ключові слова: стихійні лиха, глобальна зміна клімату, повені, глобальне потепління, страхове покриття, Міжурядова група з питань зміни клімату (МГЕЗК), українські страховики.

Abstract. Natural disasters will always be one of the most unexpected influence on the balanced world development. It is extremely difficult to anticipate and prevent such events, which is why insurance against such risks is becoming more and more common. Some years prove to be extremely unfavorable to the influence of nature. It is at these moments that the vast majority think about the need for insurance, which in these cases is supported by the global reinsurance market.

According to Swiss Re's report, the global losses from insured natural disasters in 2018 reached an amount of \$85 billion. The economic losses from natural and man-made disasters in 2019 totaled around \$140 billion. Natural catastrophes accounted for \$133 billion economic losses in 2019; Global insured losses in 2019 estimated to be around \$56 billion.

However, the insurance coverage on the global level remains insufficient: only 30 % of losses were covered by insurance and reinsurance companies

Protection of population and territories from natural disasters at present continues to be a very pressing problem. This is due to the annual increase in number of emerging natural disasters and their intensity.

As United Nations Development Program suggests (2011), populations in less developed countries with a lower Human Development Index are more affected by natural disasters. Previous 2019 year in Ukraine was marked by natural phenomena: storms of wind, hail, heavy thunderstorms and heat.

It is worth also to say that burning of deadwood has become almost a natural disaster: tens and hundreds of acres are burning in Ukraine every spring.

At the same time, no less damaging bring floods. In recent years, floods in Transcarpathia have become the most widespread natural disaster, causing catastrophic material damage, sometimes with human casualties. The reason, according to experts, is not only a natural factor, but also a human one. And this, first of all, is deforestation.

Ukraine is sitting within such «less developed countries» group so the impact of various natural disasters can cause significant damage to its economy and welfare. Natural phenomena such as floods, blizzards, hurricanes, earthquakes, wild fires, frosts, hail, etc. can destroy property at very short terms.

In Ukraine, insurance companies face the wide range of problems. Raging from an underdeveloped reinsurance market to the lack of the systematic approach to the problem.

Keywords: Natural disaster, global climate change, flood, global warming, insurance coverage, Intergovernmental Panel on Climate Change (IPCC), Ukrainian insurers.

JEL codes: D690; F010; F200; F230; G220; H770

Target setting. In recent years, there has been an increasing interest in the scientific community in the problem of climate change. This is due to the fact that the effects of climate fluctuations have an increasing impact on people and their economic activities.

Currently, the global climate change observed has gone beyond the limits that allow considering this problem as speculative. The Intergovernmental Panel on Climate Change (IPCC) (2019) provides good evidences to confirm that greenhouse

gases accumulated in the atmosphere have a significant impact on climate and the likelihood of aggravation of anthropogenic climate change during 21st century is very high.

The Sixth Assessment Report of the IPCC noted that the global warming is an indisputable fact. This follows from the observations of the growth of global average air and ocean temperatures, the melting of snow and ice, and the increase in global average sea level.

This view was reflected not only in the conclusions of the IPCC, but also of Greenpeace, the United Nations Environment Program (UNEP), the World Meteorological Organization (WMO), and the findings of Ukrainian environmental and scientific organizations. It was supported by the decisions of the International Ecological Congresses in Rio de Janeiro (Brazil, 1992), Kyoto (Japan, 1997), the Intergovernmental Commission on Climate Change (Paris, 2007).

According to Munich Re (2016), 16 of the 17 warmest years were in the period 2001-2016 and the trend continues. Over the past 100 years the temperature of surface air on Earth averaged 0.74.

Therefore, the main target of this article is to consider the possible ways to minimize the negative consequences of natural disasters using the capabilities and capacity of insurers.

Analysis of researches and publications. The problems of protection against natural disaster, private particularly, got their coverage by many domestic and foreign scientists, among them — Kaztov V., Meleshko V., Chicherin S.[5], Chodakov V., who analyzed the influence of the climatic factors to increasing poverty and welfare as well as social tension. They also study the characteristic of natural and climatic factors and their specific due to the region of Ukraine.

The main statistic concerned the impact of the natural disasters on the global economy contained the reports of International Monetary Fund, World Bank as well as global insurers' and reinsurers' reports such as Swiss Re, Hannover Re, Munich Re [6] etc.

However, not all aspects of this complex and multifaceted problem fully investigated equally. Required the further investigation the assessment of the impact of frequency and intensity of natural disasters on the economy of Ukraine. So the role of insurers on the global level due to natural disasters' management remains uncertain despite their huge potential.

Research methods. The following research methods are used in the article: empirical methods of research — observation, comparison and measurement; theoretical research methods — analysis and synthesis, systematic approach; the method of comparison, as well as the method of observation — systematic purposeful study of the object.

The authors used informative methods of research — estimation and processing of data, studying of economic processes, determination of patterns and tendencies of their development, identification of directions of further improvement of these processes, identification of available reserves and development of scientifically sound recommendations for their use in public activity.

Uninvestigated parts of general matter defining. The role of insurance companies on the global level due to natural disasters' management remains uncertain despite their huge potential. The domestic insurers should act in tandem with the

forecasters as they do all around the world. To prevent the consequences, forecasters are trying to predict in advance the timing and path of hurricanes, and governments are taking all necessary measures to protect people. For instance, every morning, American the Weather Company (TWC) publishes weather information for the current period. Governments, media channels, airlines rely on TWC forecasts and insurance companies are not aside. Reinsurers and insurers are just learning to use information to predict climate change losses. Many insurance companies and reinsurers use sophisticated models to track storms and estimate potential losses.

The research objective is to conduct thorough analysis of the current situation due to external environmental issues throughout the world and in particularly in Ukraine as well as to produce suggestions to Ukrainian insurance practitioners.

The statement of basic material. The first significant external environmental issue is flood. It is believed that floods are the cause of 40 % of all world disasters, which are accompanied by deaths and economic losses.

The calculation of losses should be treated with caution, as the methodology in different countries is not the same. Often, losses are determined by the cost of restoring the economy or the current market value of destroyed objects: buildings and property inside, bridges, motorways and railways, communication and power lines, gas and oil pipelines, etc.

Indirect damage caused by disruption of economic ties, decline in production, trade and banking operations, which affects many years after the flood, is not usually taken into account. Therefore, the above size of losses can be considered rather understated than overestimated.

Throughout the world, including Ukraine, there is a tendency for a significant increase in flood damage caused by irrational farming in river valleys, increased development of paradoxical territories and global warming. According Sorokhtin (2019), the global aggregate area of territories prone to floods is currently about 3 million sq.km, where live up to 1 billion people.

In Europe floods are the most frequent natural disaster. Loginov (2018) states that up to 75 % of insurance indemnities under insurance policies against natural disasters originate from flood. The most dangerous natural disasters in Ukraine are floods as well. Particularly persistently, water comes out of control in the west of Ukraine. Transcarpathia region is especially vulnerable. Thus, during the postwar period major floods were observed in the basin of the Tysa River in 1947, 1964, 1970, 1980, 1992.

In 1998 small rivers and streams formed a significant local runoff throughout the region. As a result, 269 settlements and 40,793 dwellings were flooded and majority were beyond repair. Nature damaged and destroyed 96 kilometers of highways, kilometers of fortifications, dams, 60 bridges. The economy of Transcarpathia suffered UAH 800 million losses.

In 1999, in Lviv, Chernivtsi and Ivano-Frankivsk regions flood destroyed 500 thousand homes and 300 thousand units of livestock. Insurance companies paid UAH 3.5 million.

In 2001, insured losses from the flood in Transcarpathia amounted to UAH 4 million (total losses amounted UAH 300 million).

According to data from authorities (Forinsurer, 2008) in last huge flood of 2008, more than 29 thousand people were evacuated from places of permanent residence during the most dangerous period of flood. More than 5 thousand people were

rescued; there were 1,019 flooded settlements; 45 thousand dwellings, 59 thousand households and 68 thousand hectares of agricultural land were flooded; 621 automobiles and 652 bridges were destroyed, 830 km of highways and 160 km of shore fortifications were destroyed. Estimated loss was UAH 5 billion.

In this event participation of insurers in the recovery of damage was estimated at UAH 40 million, which is ten times more than in 2001. However, in relative terms this is less than 1 % in the compensation structure. Insurance gap is still very big and can be compared to that in Africa and South America (Fig.1).

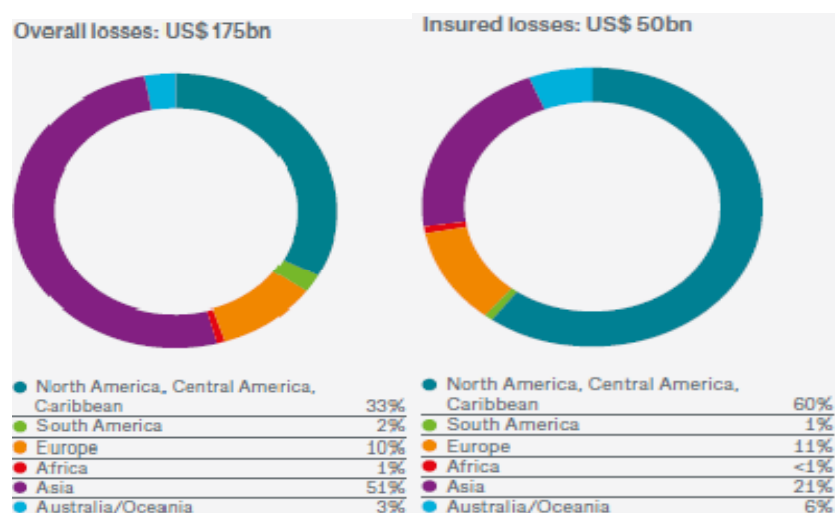


Figure 1. Loss events 2016. Percentage distribution by continent.

Source: Munich Re

There is still a lot to do to increase insurance density and insurance penetration in Ukraine. One of the reasons of existence of such gap is due to the fact that in Ukraine there is a practice where citizens who concluded insurance policies and received compensation from insurers lose right to receive compensation from the state. This leads to unequal conditions and the false thesis runs: «The one receives help from the state who isn't insured.» As a result, the interest of the population to insure property from natural disasters does not develop actively. Recently the League of Insurance Organizations of Ukraine (LIOU) with the active enrollment of Ukrainian insurers appealed to the Cabinet of Ministers of Ukraine on the necessity of changes in legislation, providing in case of a catastrophe to allow the population to receive compensation from various sources without restrictions. Additionally, LIOU initiated the introduction of a new type of insurance — the compulsory property insurance against natural disasters that should be implemented in 2020–2021.

The second significant external environmental issue is climate change. The process of warming has uneven manifestations for different regions of the planet. In final report of Ukrhidromet (2017) about the peculiarities of the climate on the territory of Ukraine, it is noted that the tendency to increase annual temperatures

throughout the territory of Ukraine is still preserved. It is +0.44 degrees over 10 years and over the past 100 years the temperature in Ukraine has increased by 1.29 degrees.

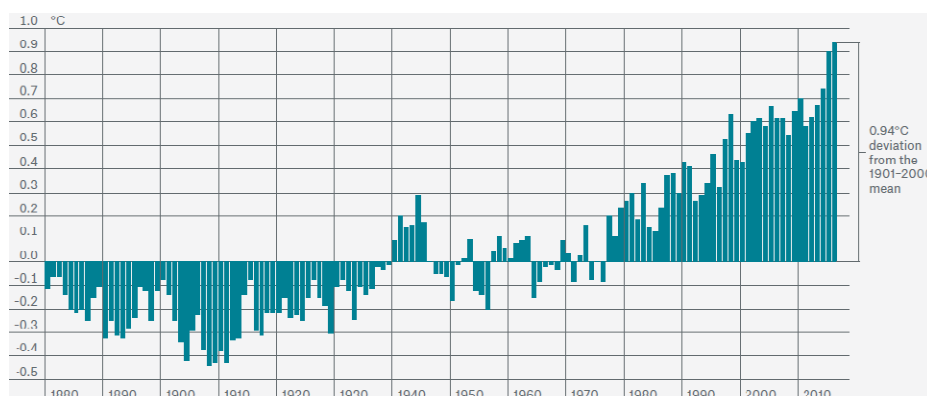


Figure 2. Deviation in global mean temperature from the 1901–2000, average.

Source: Munich Re.

According to results during the 21st century, the average temperature of surface air in Ukraine will increase. Greatest warming should be expected in northern regions of Ukraine. In regions where there is already sufficient or excessive moisture, there will be an increase in water resources. On the contrary, where water availability is currently inadequate further reduction of it is expected, which will cause more droughts in the south of Ukraine.

Katsov et al. (2016) states that as a result, in most regions of Ukraine there will be an increased danger coming from nature, namely:

- increase in frequency and scale of floods, both due to increased water reserves in the snow cover and due to heavy rains, which can cause accidents of anthropogenic nature;
- due to an increase in the average surface temperature, drying out of forests and pastures on large areas will occur, which can lead to massive forest fires;
- acceleration of snow melting in Carpathian mountains will lead to the growth of landslides, avalanches, subsidence, weakening of the buildings foundations, which can also cause accidents of anthropogenic nature;
- increase in mortality due to extremely high temperature in summer;
- reduction of the number and volume of sources of drinking water due to unfavorable combination of climatic changes and environmental factors etc.

These changes necessitate a change in the prevailing management traditions, which in turn require changes in the way of life and economic behavior, methods of farming. At the microeconomic level these changes involve changes in daily activities of population, as well as changes in production technologies and forms of management of enterprises, ensuring their adaptation to new conditions. At the meso- and macroeconomic levels, there is a need to adjust medium- and long-term programs for sectoral and regional development, as well as economic policies, based on the specific effects of climate change on specific territories.

Analysis of current and potential impact on business performance.

In the light of quite recent events related to devastating consequences of floods in various regions of Ukraine, the issue of the possibility to insure such peril is topical. Currently, the fact is such type of insurance in the Ukraine does not exist due to the lack of a methodology for determining insurance rates for natural disasters perils.

In Ukrainian insurance market, such insurance is carried out as part of property insurance. As a rule, when issuing property policies companies provide comprehensive coverage, namely protection against FLEXA perils and natural disasters. However, cases where protection is acquired only against FLEXA are frequent.

Theoretically, it is possible to cover only natural disasters, but in view of the fact that cost of such policy would be too small in comparison with the volume of liability and probability of accumulation of losses in one territory, such service is not provided by Ukrainian insurance companies. Thus, the insurance rate for natural disasters in the structure of property gross insurance rate is not allocated.

In addition, due to high competition the actual structure of gross rates offered on Ukrainian insurance market does not reflect the likelihood of occurrence of natural disasters. As a result, the insurance premium for such perils is not accumulated and is used for current expenses and indemnity payments for current losses.

This problem would become crucial in upcoming years as the state plans to establish new compulsory type of property insurance against natural disasters preliminary in 2020–2021.

Currently there is not any formed idea about how the insurers would proceed with the creation of new insurance products, but most underwriters agree that to accumulate a premium on catastrophic risks, as well as for the purposeful use of reserve funds, it would be necessary to determine the rate system of this type of perils throughout Ukraine. Initially this task could be implemented at the level of administrative regions around perils representing the most significant threat in the region.

The following estimation method was proposed:

- identification of existing natural disaster perils for each of administrative regions;
- determining critical peril for each region;
- distribution of probability of occurrence of critical peril within the region;
- determination of insurance rate for critical peril taking into account the amount of potential damage as a result of its occurrence.

The division of regions of Ukraine by their exposure to certain types of natural disasters (against which property would be insured due to the high probability of their occurrence and the high level of probable damage) may look something like this:

Because of such assessment, the formation of reserve funds to compensate for damage from natural disasters would be made by accumulating the premium received from the insurance of these perils.

One of the main tasks would be to determine rates based on the cost of future expenses that can arise as a result of the onset of such events, i.e. at the amount of the potential loss. The usual method of calculating rates based on data on losses in previous years can't be applied for natural disasters since these events have «heavy tails», i.e. are extremely rare and don't repeat every year and there is no annual loss statistics.

Table 1

THE DISTRIBUTION OF NATURAL PERILS BY REGIONS (work in progress)

#	Region of Ukraine	Perils
1	Dnipropetrovsk and Odessa regions	Hurricanes, strong winds (25–34 m/s), heavy snowfalls, floods due to heavy rains during snowmelt in the spring
2	Crimean peninsula	Mudflows, avalanches (southern districts), earthquakes, hurricanes, high winds (25–34 m/s), heavy snowfalls
3	Lviv, Ivano-Frankivsk and Transcarpathian regions	Landslides in river valleys, some areas (Carpathian mountains) are prone to mudflows and snow avalanches, strong winds (25–34 m/s, in some places 35 m/s and more), heavy snowfalls, floods (dangerous and moderately dangerous) due to heavy rains during snowmelt in the spring.
4	etc...	etc...

Source: completed by the authors.

Nevertheless, this is something to consider for not now but more closely to 2021 and with the specialized help of reinsurers as their rates would have a huge impact on sizes of direct insurance rates.

As for the potential moderate / distant future impact of hydrological events such as floods, climate change and their consequences on human activities — such events would lead to significant socioeconomic damage and would directly affect the efficiency of a number of economic sectors, including the insurance market.

Climate change would have a very significant impact on insurance, as new insurance risks would emerge. As there is an increase in the intensity of extreme weather events, risk of damage to property also increases. In addition, global warming is contributing to an increase in water vapor in the atmosphere, which means that with each year we have the greater potential of massive floods.

In regard of all abovementioned, for Ukrainian insurers climate change and floods are more of a threat than an opportunity for business development.

Of course, now it is all in years ahead and predict future is rather hard but as changes would come, they would need to adapt to such hazards by predicting how massive floods and climate change would affect the insurance perils and behavior of its clients. It would be necessary to assess the risks and revise some corporate procedures (pricing, policies conditions, etc.), taking into account clients exposure to perils while looking on their scope, geographical location, availability of opportunities and conditions for doing business etc.

Climate change offers other interesting opportunities for the insurers. In some cases, they might help clients who are engaged in renewable energy sources or new technologies in the field of energy efficiency and energy saving. Insurance companies could be able to compensate for their short-term risks associated with the use of «dirty» and inefficient industrial technologies, as well as reduce the long-term risks associated with extreme weather events like floods.

Table 2

**POTENTIAL THREATS AND OPPORTUNITIES ASSOCIATED WITH CLIMATE CHANGE
AND FLOODS FOR UKRAINIAN INSURERS AND THEIR CLIENTS**

Type of insurance / scope of client's business	Threats	Opportunities
Assets / Property	<ul style="list-style-type: none"> - increase in frequency of extreme weather events, threatening solvency and liquidity; - complication of underwriting procedures; - lack of capital and problems with renewals; - unpredictable reaction of public sector based on incorrect information. 	<ul style="list-style-type: none"> - increase in demand for insurance and alternative risk transfer; - insurance of Kyoto projects; - management of natural disasters outcomes; - possibility of insurance of prototype models of new equipment.
Various accidents	<ul style="list-style-type: none"> - unexpected claims from obligation to observe caution or observe the interests of the company; - commodity failure (the failure of new products); - destruction of transport. 	<ul style="list-style-type: none"> - insurance of professional services (liability) in the carbon markets; - «green» transport insurance; - «green» houses insurance.
Life and health	<ul style="list-style-type: none"> - episodic effects on health; - underestimation of life expectancy due to temperature increase; - reduction of incomes due to natural disasters. 	<ul style="list-style-type: none"> - increase in demand for health insurance; - growth of economy and welfare as a result of transfer of new technologies from developed countries.
Other insurance themes	<ul style="list-style-type: none"> - increase in financial losses due to a business interruption; - growth of financial losses in the agro-industrial sector; - high risk level when introducing new technologies in energy sector. 	<ul style="list-style-type: none"> - development of alternative risk transfer; - risks related to scientific and developmental research in the field of low-carbon technologies; - insurance of sales of quotas on pollution; - trade risks associated with the export of technology; - transition of «carbon» to the category of insurable assets.

Source: completed by the authors.

However, there may be other risks associated with climate change. The increase in winter temperatures can contribute to an increase in life expectancy, which will be an additional burden for health insurance and pension funds. Other expected effects of global warming may be related to claims for reduced sales, heat health damage, damages to vehicles and houses, delays in passenger flights and environmental pollution.

Thus, climate change and floods would create for insurance companies not only new threats but also new opportunities. In this regard the insurers would have to supply new products and services to the market that meet new needs of their clients, which may require a change in internal procedures, underwriting and management policies.

Minimizing the negative consequences while simultaneously taking into account and using the potential positive effects associated with climate change would be a very interesting task not only for Ukrainian, but also for global insurers.

Conclusions.

Participations in reinsurance NatCat conferences to follow current trends, pricing, upcoming future risks;

2. Trainings for the claims handling procedures after massive destructions caused by nature;

3. Participations in development of relevant legislation acts through LIOU, including changes in technical regulations and standards of systems and equipment, establishment of a strict land and construction norms in areas with increased risk of natural disasters occurrence;

4. Development of internal system for monitoring and forecasting of natural hazards;

5. Improvement of internal system of alerting insureds of natural hazards and informing them about actions in cases of emergency (shelters locations, possible electronic shortages);

6. Creation of new insurance products on property insurance against natural disasters close to 2021–2022.

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Загребя М.М.

кандидат економічних наук,
доцент кафедри економічної теорії, маркетингу та економічної кібернетики
Центральноукраїнський національний технічний університет
проспект Університетський 8, Кропивницький, Україна
e-mail: yandexthebest@gmail.com
ORCID:0000-0003-0440-2106

Загребя Ю.О.

студентка кафедри економіко-математичного моделювання
Інституту інформаційних технологій в економіці
ДВНЗ «КНЕУ імені Вадима Гетьмана»
Львівська площа 14, Київ, Україна
e-mail: juliezagreba@gmail.com
ORCID:0000-0003-0169-7631

МІСЦЕ ДОЛАРА США ТА КРИПТОВАЛЮТ У КОНТЕКСТІ ГЛОБАЛЬНИХ ЗМІН У СВІТОВІЙ ЕКОНОМІЦІ