

Environmental Risk Management in Insurance Sector in Latvia

Aija Graudina, BA School of Business and Finance

Abstract: The objective of this article is to explore climatic environmental risks in the context of the growing global impact, by characterizing the administrative form of risk management, which is the most appropriate for Latvia's insurance sector.

Fundamental environmental risks are subdivided into natural risks, such as earthquakes, storms and floods; public exposure risks, such as nuclear power, climate change (pollution: air, water, earth) and economic crisis risks. Impact of particular risks is inherent in one risk-specific unit (object) or in a small number of risk-specific units (objects). Particular risks are subdivided into natural risks, such as wind, hail, drought and downpour, and third-party effect risks.

Global experience demonstrates the use of new forms of insurance, by insuring fundamental environmental risks, such as captive insurance companies, financial services futures and insurance schemes.

The administrative form of combined insurance – the insurance scheme – is the optimum choice for management of fundamental and particular environmental risks from both theoretical and practical point of view in Latvia's insurance sector. Communication among the members of the insurance scheme is formed within the analysed scheme.

Keywords: fundamental environmental risks, particular environmental risks, climate change, insurance scheme.

I. INTRODUCTION

Global Change in the Insurance Environment

Climate change affects the development of the global economy, including the insurance sector. Manifestations of climate change have a wide range of impacts on the environment, from, for example, the impact of excessive drought on agricultural land to the increasing amount of hurricane damage. Countries should establish cooperation, preferably following a joint plan, aimed at carrying out

measures for environmental impact mitigation. Developing countries are exposed to climate change impacts to a much greater degree. World statistics show that in the recent years there has been an increase in the frequency of storms, floods and droughts and in the amount of the related loss. Climate risks, particularly catastrophic risks (fundamental risks) are difficult to insure, because, as experience shows (earthquakes in Haiti, New Zealand and Japan and floods in Australia), the loss is very extensive (resulting in an expensive actuarial premium) and the demand for private insurance may be reduced: the increase in the level of uncertainty leads to the increase in the objective need for raising insurance premiums. The increasing level of uncertainty results in an increased complexity of underwriting: the insurance service objectively becomes more expensive. (see the list provided by the authors in (Table 1 [5]).

For example, looking at the statistics of the top natural disasters in terms of losses, six of the world's ten largest natural catastrophes with the biggest damage since 1950 occurred in 2004 and 2005, which implies that the frequency of occurrence and volume of natural disaster risks will grow in the future [5].

Cost of environmental impact mitigation has been estimated in the countries of the world on the whole. According to the data of the Geneva International Association for the Study of Insurance Economics of 2009, this cost amounts to 4% of the global GDP. Meanwhile, the data of the United Nations show that the estimated annual funding cost for global adaptation to climate change required by the countries of the world after 2030 will be 50 to 170 billion US dollars, of which 30 to 70 billion US dollars will be invested in the economy of the developing nations [16].

TABLE 1
TOP 10 WORLD'S LARGEST NATURAL DISASTERS IN TERMS OF LOSSES FROM 1950 TO 2005, MILLION USD

Date	Event	Place	Total loss	Amount of compensation paid	Casualties
25.08.2005	Hurricane Katrina	USA	1.25.000	61.000	1.322
23.08.1992	Hurricane Andrew	USA	26.500	17.000	62
17.01.1994	Earthquake	USA	44.000	15.300	61
21.09.2004	Hurricane Ivan	USA, the Caribbean	23.000	13.000	125
19.10.2005	Hurricane Wilma	USA, Mexico	20.000	12.400	42
20.09.2005	Hurricane Rita	USA	16.000	12.000	10
11.08.2004	Hurricane Charley	USA, the Caribbean	18.000	8.000	36
26.09.1991	Typhoon Mireille	Japan	10.000	7.000	62
09.09.2004	Hurricane Frances	USA	12.000	6.000	39
26.12.1999	Winter Storm Lothar	Europe	11.500	5.900	110

The factors caused by the global climate change with an impact on the insurance sector:

1. There is an increase in the probability of extreme risk events, such as the Eyjafjallajökull Volcano eruption in April 2010, resulting in the loss 1.7 billion U.S. dollars and other damages [10];
2. Loss due to extreme risks may exceed the level of financial management;
3. Social and economic tension may reduce the demand for insurance;
4. The increasing impact of natural risks on the environmental risk liability insurance (such as the consequences of the earthquake and tsunami of 11 March 2011 – the environmental damage caused to Japan and other countries) [12].

The factors which have an impact on the insurance services are the following: increase in losses as a result of high winds and extensive floods, landslides, hail; damage from river and coastal flooding and mud. Agricultural risk insurance: diseases, insects, drought, wind and hail. Life and health insurance: malaria, malnutrition in children under 5 y.o., infectious diseases, heat effects (Europe in 2003) and heart and respiratory diseases associated with ozone concentration in the air. Liability insurance: climate change resulting in the increase in natural risk impact [11].

By emphasizing the prevention policy, the insurance sector, in the context of global change, has a unique opportunity to offer techniques and services for environmental impact mitigation to the public.

II. INSURANCE SECTOR

In order to foster discussion on the insurance sector service options in environmental risk management in Latvia within the context of global change impact, we should first explore the place of the point of contact of the insurance sector and other sectors of economy, *i.e.* the risk, in the shared space of risks, and prerequisites for identification of an insurable risk. When choosing to describe the risks in the same sector or area, two identical risky situations cannot be found. In general, risk is related to uncertainty, which is attributed to occurrence of an event or lack of knowledge of the outcome of the event, with the focus of the risk's link to unfavourable events [3].

M.J. Machina, D. Schmeidler (1992) describe Level 1 of sensitivity to risk as a level where the result can be foreseen precisely. This level of sensitivity in a practical situation is characterized by the laws of physics, such as the law of

conservation of energy and the law of gravity (see the structure created by the authors in Table 2 [4]).

A person's individual attitude to risk may differ and it differs from the perception of risk of professional risk underwriters who work for insurance companies. For example, the level of uncertainty for specific risk depends on the attitude to risk. Where a private person perceives risk of an earthquake, flood, storm and other natural disasters and catastrophes as the highest (level three) degree of uncertainty, the specialists of an insurance company and public risk management, according to their sphere of duties, will perceive an earthquake, flood, storm, etc. as the medium degree of uncertainty (level two). These differences in attitudes to the same risk between individuals and private insurers or governments may be formed as a result of different levels of risk management economic capacity. The economic capacity of risk management is characterized by financial, information and risk management parameters, in other words by the funds available to compensate for potential losses.

A private person may possibly want to invest a certain amount of his/her own financial means to be at the lowest possible level of uncertainty.

Insurance offers such a service to both private persons and legal entities. When carrying out risk management, insurance companies create a necessary scientific and economic capacity based on economic regularities in order to reduce the uncertainty. For example, when buying insurance, a cereal manufacturer, who sees his potential crop yield at the second level of uncertainty, may move to the first level of uncertainty from the second level of uncertainty with regard to potential losses.

We can conclude from the abovementioned, that the principal task of insurance companies is to reduce uncertainty and assume risk, *i.e.* to transfer risk from a private person under its management. Not all risks can be insured and insurable risks should comply with specific requirements and classification.

The insurable risks are theoretically divided into *fundamental environmental risks* and *particular environmental risks* [6, 7]. Both groups of these risks characterize the global change risks. A fundamental or difficult-to-insure (systematic) risk is a risk whose frequency cannot be forecast, but a large part of the world population is subject to its influence at the same time.

Fundamental environmental risks are subdivided into:

1. natural risks: earthquakes, storms and floods;
2. public exposure risks: nuclear power, climate change (pollution: air, water, earth) and economic crisis risks.

TABLE 2

COHERENCE LEVELS OF RISK CERTAINTY AND UNCERTAINTY

Level of uncertainty	Characteristics of the level of uncertainty	Example
No level (certainty)	Result is foreseen precisely	Laws of physics
Level 1 – lowest (objective uncertainty)	Result can be identified, possible variants are known	Gambling: playing cards, dice
Level 2 – medium (subjective uncertainty)	Result can be identified, possible variants are unknown	Fire, crop failure, car crash, money investments
Level 3 – highest	Result cannot be identified, possible variants are unknown	Space research

Such risks include, for example, global economic depression, hurricanes on the US West Coast, floods in Europe, earthquakes in the Middle and Far East, the potential loss of cereal crop yields due to natural risks and unemployment.

This means that losses in certain geographical areas correlate positively and are dependent on each other because, for example, an earthquake will inevitably inflict major losses on health and property insurance. Such risks are impossible to identify and unite into pools. According to theory, if a risk cannot be identified and united into pools, such risk is impossible to diversify, thus, making it uninsurable in the view of classical theory of insurance. The major task of insurance is to disperse the risk or potential losses within the insurance pool. The insurance pool is made by insurers, by combining many similar risk-specific units therein. The insurance pool can be defined as a mutual agreement between the insurers and the insured parties – the holders of similar risk-specific units – on insurance of a certain type, by assuming compensation for potential losses related to similar risk-specific units, as usually only a small part of the insurance pool members suffers losses.

Fundamental natural risks are further classified in two subgroups: major risks that result in potentially large losses (*primary perils*) and less significant risks (*secondary perils*). The first subgroup includes:

1. earthquake risks;
2. hurricane risks;
3. snow storm risks.

In the author's view, the secondary perils involve:

1. flood risks;
2. landslide risks;
3. hail risks;
4. hurricane risks;
5. snow storm risks outside Europe;
6. frost and forest fire risks. [15]

Global experience demonstrates the use of new forms of insurance, by insuring fundamental or difficult-to-insure (systematic) risks, such as captive insurance companies, financial services futures and insurance schemes.

Impact of particular risks is inherent in one risk-specific unit (object) or in a small number of risk-specific units (objects). For example, fire in a factory or a traffic accident in which 10 vehicles are involved simultaneously, are considered to be particular risks.

Particular risks are subdivided into:

1. natural risks: such as wind, hail, drought, downpour, etc.;
2. third-party effect risks.

The insurable risks which do not affect society as a whole, but apply to personal assets, property, health, business, etc., such as a traffic accident, vehicle theft or fire in the private property do not cause a global problem. Such risks are possible to identify and unite into pools. This means that the risks can be diversified and therefore are insurable.

Ideally, insurable risks should meet several requirements:

1. the risk should be subject to evaluation in money terms;

2. the insurable risk is presented by a big amount of risk-specific units;
3. the buyer of the insurance policy should be a "risk neutral" person;
4. the risk should be particular;
5. the losses should be incidental;
6. the losses due to risk should be identifiable;
7. the premium should be economically sound [6, 7].

As it has been already mentioned, both risk groups – fundamental and particular risks – characterize the environmental risks. For example, the water in the Daugava River may be contaminated as a result of:

1. a traffic accident, with fuel having leaked into the water on the territory of Latvia (a particular risk);
2. an industrial chemical accident on the territory of Belarus (a fundamental risk).

In accordance with the First Council Directive of the European Communities 73/239/EEC (24 July 1973), the insurance sector is divided into two independent sub-sectors: life insurance and non-life insurance [14].

Section 1(7) of the Law on Insurance Contracts classifies insurance according to the object of insurance [1]:

insurance against losses and damages – material values or interests; civil liability insurance – personal civil liability; personal insurance – person's life, health or physical condition. Insurance against losses and damages and civil liability insurance refer to non-life insurance. The same Law defines civil liability insurance in the following way: civil liability insurance is insuring the civil liability of a person from the losses caused to third parties as the result of such person's action or failure to act.

The regulatory environment for insurable risk management in Latvia's insurance market provides 19 types of insurance services. Below is a detailed description of the types of the offered insurance services under Section 12 of the Law on Insurance Companies and Supervision Thereof, setting forth the types of insurance for which licences are issued in Latvia [2]:

1. Accident insurance. Personal insurance by paying a predetermined amount of money in case of various injuries, permanent incapacity for work and death.
2. Health insurance (insurance against diseases). Insurance of personal medical expenses.
3. Land transport insurance, except for railway transport. Insurance of any land vehicles registered for road traffic against losses caused by traffic accidents, natural disasters or third-party intervention (vandalism, theft).
4. Railway transport insurance. Railway rolling stock insurance against losses resulting from a collision, natural disasters or third-party intervention.
5. Aircraft insurance. Aircraft insurance against unexpected losses resulting from a collision, natural disasters or third-party intervention.
6. Ship insurance. Ship insurance against unexpected losses resulting from a collision, natural disasters or third-party intervention.

7. Freight insurance. Freight insurance against mechanical damage and third-party intervention during any transportation.
8. Property insurance against damage by fire and natural disasters.
9. Property insurance against other losses. Insurance of real estate and physical assets (equipment, goods, stock, etc.) against damage by fire, natural disasters and third-party intervention.
10. Civil liability insurance for owners of land vehicles. The insurer shall bear the losses caused by the insured vehicle to other vehicles and persons (other than the vehicle occupants) and the surrounding property, which has been damaged in the event of the road traffic accident.
11. Civil liability insurance for owners of aircraft. The insurer shall bear the losses caused by the insured vehicle to other vehicles, persons and the surrounding property (liability to passengers is singled out).
12. Civil liability insurance for owners of ships. The insurer shall bear the losses caused by the insured vehicle to other vehicles, persons (liability to passengers is singled out) and the surrounding property, except for the cargo carried.
13. General civil liability insurance. The insurer shall bear the losses resulting from negligence or professional misconduct in various professional spheres of activities (on the part of doctors, lawyers, notaries, auditors, accountants, carriers, operators, etc.), as well as on the part of landlords and leading officials.
14. Credit insurance. The insurer shall cover a variety of liabilities to credit institutions: risk of default of loan and interest; this also includes the insurance of promissory notes and deposits.
15. Suretyship insurance. In case of the insured person's bankruptcy, the insurer shall cover certain obligations of such person, such as customs duties and contractual (construction work) commitments.
16. Insurance of various financial losses. The insurer shall cover certain types of losses suffered by the insured person, for example, due to business interruption (property damage), non-occurrence of an

event or occurrence of an unplanned event, as well as occurrence of political risks.

17. Insurance of legal expenses. The insurer shall cover legal expenses related to violation of the insured person's rights or maintenance of claims in connection with an insurance case.
18. Assistance insurance. The insurer may offer the provision of a variety of services as supplementary insurance to foreign travel insurance (health and accident insurance), such as insurance against automobile breakdown or legal issues.
19. Life insurance. The insurer shall make long-term savings from contributions and pay out the accumulated amount when the insured person reaches a certain age.

We can conclude that environmental risks as a type of service are not defined directly in Latvia's insurance market. World experience shows that the environment-related risks are generally defined in the context of liability insurance. Lately, there has been a significant increase in the impact of natural risks on liability insurance due to the growth of volume and frequency of damages caused by natural disasters.

III. ENVIRONMENTAL RISK MANAGEMENT IN INSURANCE

Insurance services available in Latvia's insurance market are offered by fifteen non-life insurance companies (9 of which are Latvian insurance market participants and 6 are branch offices of other EU companies) and nine life insurance companies (4 of which are Latvian insurance market participants and 5 are branch offices of other EU companies). All the companies operate in the private sector. (Financial and Capital Market Commission (FCMC), 4th Quarter 2010). In accordance with the data listed in the electronic resource of the FCMC, the gross premiums written amounted to LVL 190.3 million in 2010, while the gross claims paid over the same period amounted to LVL 111.0 million (see Fig. 1. [13]).

Figure 1 presents a bar chart showing the gross premiums written and gross claims paid by insurance companies over the last five years. If macroeconomic indicators have a decreasing trend, the loss ratio has a tendency to improve (58% in 2010 compared to 68% in 2009).

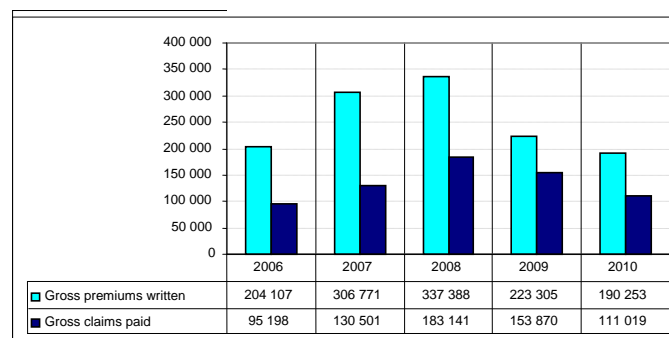


Fig. 1. Gross premiums written and gross claims paid by insurance companies in Latvia's insurance market in the period from 2006 to 2010 (thousands LVL)

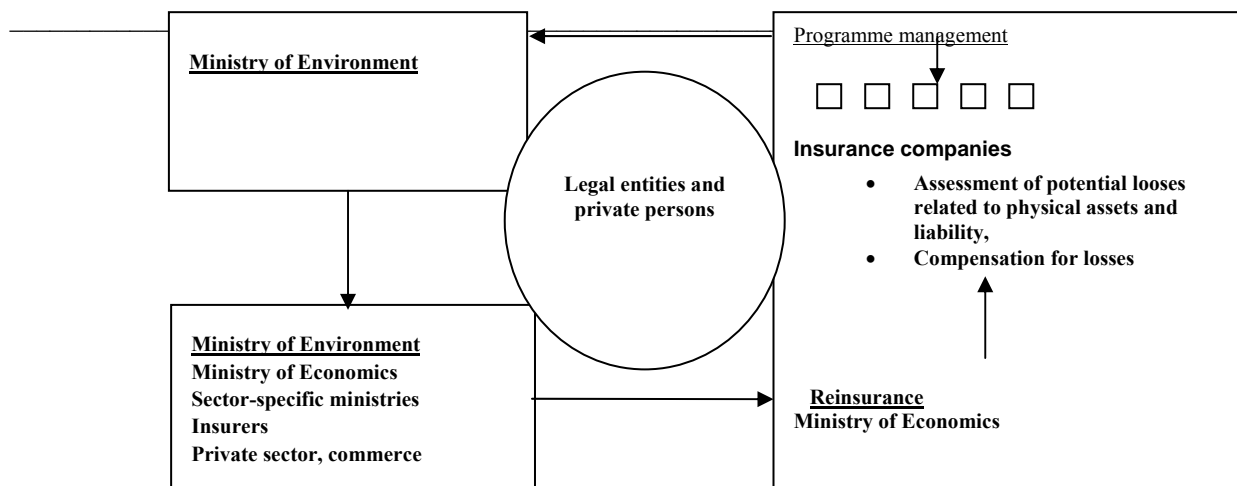


Fig. 2. Communication between the public and private sectors in creation of the insurance scheme for environmental risk management in Latvia

The choice of administration of the insurance scheme determines the nature of insurance:

1. Private insurance.
2. State insurance – public sector.
3. Combined insurance – partnership of the private and public sectors (insurance scheme).

The administration form of combined insurance is the optimum choice for fundamental and particular risk management from both theoretical and practical point of view. Communication between participants of the insurance scheme is formed within the insurance scheme (see the structure created by the authors in Fig. 2 [8]).

Using the example of the insurance scheme in Spain [9] for agricultural risk insurance, as well as evaluating the Japanese example of build-up of preventive funds in public and private partnership (PPP) insurance schemes for solving the nation-wide crisis, the insurance scheme for environmental risk management in Latvia has been proposed.

REFERENCES

- [1] LR likums (1998) *Par apdrošināšanas līgumu [The Republic of Latvia Law on Insurance Contracts (1998)]*, LR Normatīvie dokumenti: Vērtspapīri. Apdrošināšana. Rīga: Lietišķās informācijas dienests, AP - 1 - 5 - 1 – AP - 1 - 5 - 28.
- [2] LR likums (1998) *Apdrošināšanas sabiedrību un to uzraudzības likums līgumu [The Republic of Latvia Law on On Insurance Companies and Supervision Thereof (1998)]*, LR Normatīvie dokumenti: Vērtspapīri. Apdrošināšana. Rīga: Lietišķās informācijas dienests, AP - 1 - 4 - 1 – AP - 1 - 4 - 86.
- [3] J. Laffont, *Essays in the economics of uncertainty*. Cambridge, Massachusetts and London (England): Harvard University Press, 1980. p.144.
- [4] M. J. Machina, D. Schmeidler, *A More Robust Definition of Subjective Probability*. *Econometrica* 60, no.4, 1992, p.745.
- [5] A. Charpentier, *Insurability of Climate Risks* The Geneva Paper, (2008) 33,,doi:10.1057/palgrave.gpp.2510155, p.91-109
- [6] E. George, Rejda, *Principles of Risk Management and Insurance*, 8th ed. USA, 2003, p.686.
- [7] H D. Skipper, *International Risk and Insurance: An Environmental – Managerial Approach*. USA, 1998, p.756.
- [8] S. O. Collin, L. Hansson, *Explaining Public-Private Partnerships – An Inductive Analysis of Four Swedish Cases*. International Journal of Public-Private Partnerships SHU Pres, January 2000, vol.2 (2), pp. 251–271, p.346.

The scheme is based on cooperation between the public and private sectors. The public sector is represented by the Republic of Latvia Ministry of Environmental Protection and Regional Development, Ministry of Economics and other sector-specific ministries, which make an establishment either regionally or within the relevant sectors. Its tasks shall include defining of the sector's environmental risks, drafting of the annual insurance plan, determining the level and amount of premiums and subsidies, as well as monitoring. The private sector is represented by the association of insurance companies operating in this scheme on the basis of co-insurance. The association, on behalf of its members, shall undertake the routine process administration, such as risk quantification, determination and receipt of premiums, assessment of damages, compensation payouts, etc.

A public fund is created under the supervision of the Ministry of Economics with the aim to operate as obligatory reinsurance.

- [9] J. Martinez, C. Vega-Garcia, E. Chuvieco, *Human-caused wildfire risk rating for prevention planning in Spain*, Journal of Environmental Management. 90: (2009) pp. 1241 – 1252
- [10] “Spreading Cloud”, The Times, 22.04.2010, p. 7
- [11] B. Porro, “Climate Change and Possible Impacts on the Insurance Industry”, Working Paper Series of The Geneva Association 2008. October, p.10.)
- [12] Matsushita Katsuo, *The World after Japan's March 2011 Natural Disaster - from risk adaptation and risk scenario perspectives* http://www.genevaassociation.org/PDF/Risk_Management/GA2011-RM_sc4.pdf
- [13] Apdrošināšanas tirgus 2010.gada 4. ceturksnis FKTK.lv/statistika/apdrosinasana/ceturksna_parskati/2011-02-28_apdrosinasanas_tirgus
- [14] The First Council Directive of the European Communities 73/239/EEC on the coordination of laws, regulations and administrative provisions relating to the taking-up and pursuit of the business of direct insurance other than life assurance (24 July 1973), <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31973L0239:LV:HTML>
- [15] R. Singh, Climate Change: Insurance has a Role to Play Today. The Geneva Association. *Risk Management No 45/May 2009*, pp. 5 – 6.
- [16] Andrew Dlugolecki, *The Climate Change Challenge*, 2009. www.genevaassociation.org/PDF/Risk_Management/RM_SC1.pdf.
- [17] Ch. Van Oppen, *The Role of Insurance in Disaster Reduction*. United Nations – International Strategy for Disaster Reduction. Management Group, Institute of Civil Defence and Disaster Studies (ICDDS), UK. May 2001, p. 12.

Aija Graudina is a Doctor of Economic Sciences. She works as an Associate Professor at BA School of Business and Finance (Latvia). Specialisation: insurance and reinsurance industry, insurance economy (green economy). She is a member of the International Insurance Society

(IIS) and the Latvian Association of Economics. A.Kalnina street 2-5, LV1050, Riga, Latvija, Phone: 0037129517151 e-mail: aija.graudina@ba.lv

Aija Graudiņa. Vides risku pārvaldība apdrošināšanas nozarē Latvijā

Raksta mērķis: klimatisko vides risku pieaugošās globālās ietekmes kontekstā raksturot Latvijas apdrošināšanas nozarei piemērotāko risku vadības administratīvo formu. Mērķa sasniegšanai izmantota monogrāfiski aprakstošā metode problēmu elementu un sintēzes kopsakarību noteikšanai, zinātniskās indukcijas metode - atsevišķu faktu apkopošanai vispārīgos atzinumos un kopsakarībās, dedukcijas metode - empīrisko secinājumu loģiskai sintēzei, kā arī statistiskās grafikas metode. Apdrošināšanas sabiedrību pamatuzdevums ir nenoteiktības samazināšana, riska uzņemšanās, t.i., privātās un juridiskās personas riska pārņemšana savā vadībā. Ne visus riskus var apdrošināt, bet apdrošināmiem riskiem būtu jāatbilst zināmiem noteikumiem un klasifikācijai. Pasaules pieredze rāda, ka ar vidi saistītie riski pārsvarā definēti atbildības apdrošināšanas kontekstā, kur atbildība par zaudējumiem var attiekties arī uz sekundāriem zaudējumu izraisītājiem. Pēdējā laikā, saistībā ar dabas katastrofu zaudējumu apjoma un biežuma palielināšanos, būtiski pieaug arī dabas izraisīto risku ietekme uz atbildības apdrošināšanu. Latvijas apdrošināšanas nozarē fundamentālo un nelielo vides risku vadībai gan teorētiski, gan praktiski vispiemērotāk izvēlēties kombinētās apdrošināšanas administratīvo formu – apdrošināšanas shēmu. Apdrošināšanas shēmas ietvaros veidojas komunikācija starp apdrošināšanas shēmas dalībniekiem. *Atslēgas vārdi:* fundamentālie vides riski, nelielie vides riski, klimata izmaiņas, apdrošināšanas shēma.

Айя Граудиня. Управление экологическими рисками в страховой отрасли Латвии

Цель статьи: в контексте возрастающего глобального влияния климатических экологических рисков дать характеристику административной форме управления рисками, наиболее подходящей для латвийской страховой отрасли. Для достижения поставленной цели в статье использован метод монографического описания для определения проблемных элементов и синтеза взаимосвязей, метод научной индукции - для обобщения отдельных фактов в общих заключениях и взаимосвязях, метод дедукции - для логического синтеза эмпирических выводов, а также метод статистических графиков. Основная задача страховых обществ заключается в сокращении неопределённости, контроле рисков, т.е. перенятии рисков частных и юридических лиц под своё управление. Не все риски могут быть застрахованы, однако страхуемые риски должны соответствовать известным правилам и классификации. Мировой опыт показывает, что риски, связанные с окружающей средой, в основном определены в контексте страхования ответственности, при которой ответственность за ущерб может также распространяться и на ущерб от вторичных источников. В последнее время, в связи с ростом объёма и учащением потерь при природных катастрофах, существенно возрастает также и влияние природных источников рисков на страхование ответственности. В латвийской страховой отрасли для управления фундаментальными и отдельными экологическими рисками, как теоретически, так и практически наиболее оптимальным выбором является административная форма комбинированного страхования - схема страхования. В рамках схемы страхования формируется коммуникация между участниками схемы страхования.