

NATURAL DISASTER INSURANCE IN VIETNAM: A REVIEW

Assoc. Prof. Dr. Dinh Duc Truong

truongdd@neu.edu.vn

Dr. Nguyen Dieu Hang

hangnd@neu.edu.vn

*Faculty of Environmental, Climate Change and Urban Studies,
National Economics University, Hanoi, Vietnam*

Abstract

Disaster risk insurance companies pay for when a disaster occurs. In Vietnam, the application of disaster insurance is limited. This report assesses the current status of disaster risk insurance and related operations in Vietnam, including agricultural insurance and public property insurance. Based on the existing challenges and difficulties, the report demonstrates recommendations to promote the development of disaster risk insurance as follows: From the Government, it is necessary to complete the legal and institutional framework related to disaster risk insurance, support farmers to participate in agricultural insurance, provide guide in detail and standardize the process related to public property insurance; strengthen human capacity and technical support. The Government also needs to develop a disaster risk quantification model and build up a database on natural disaster risks and public assets as a basis for calculating risks and premiums, etc.; towards setting up a disaster risk insurance fund; develop investment mechanism, using disaster risk bonds. Finally, the Government needs to raise people's awareness about the importance of insurance. From the insurance companies, it is necessary to collaborate closely with localities to develop appropriate agricultural insurance products, research and provide more disaster risk insurance products for public and private property; choose the appropriate distribution channel; actively collect and build up databases on weather and natural disasters; Design and implement marketing programs to provide full information to customers.

Keywords: *natural disaster insurance, agriculture insurance, property insurance, Vietnam*

1. Introduction

Disaster risk management and capacity building to respond to Climate Change are important issues that need to be addressed in Vietnam. Vietnam is one of the countries most threatened by climate risks in the East Asia Pacific region. With a long coastline of 3.260 km Vietnam is subject to frequent storms, floods, drought, coastal erosion and landslides. In the context of current climate change, the frequency and severity of weather events is also increasing. Extreme weather events and catastrophes have made serious socio-economic consequences, causing serious economic losses, with losses of approximately 1% of GDP. In 2017, the Government, with the World Bank's technical assistance, also conducted a risk

assessment estimated that the current assets of up to 1,3 trillion USD are being threatened by risk but only about 5% of total domestic assets are insured (World Bank, 2018).

To this moment, despite many efforts, the construction and implementation of financial solutions have not met the requirements of effective support for natural disaster prevention and mitigation. Most of the currently applied solutions still rely heavily on the Government budget but a few risk transfers measures. Therefore, the long-term solution that Vietnam needs to consider is insurance for disaster risks.

This article is to assess the implementation of insurance related to disaster risks in Vietnam with these main types of insurance: disaster risk insurance, agricultural insurance and property insurance. The applied research method is secondary review on existing data, research and analysis to make an assessment. The object of the study is the insurance related to disaster risk in Vietnam. From the current situation assessment, difficulties and challenges in insurance implementation related to disaster risks will be drawn and proposed some recommendations to develop disaster risk insurance in the future.

2. Current situation of disaster risk insurance in Vietnam

Vietnam is frequently affected by natural disasters. Over the years, Vietnam has suffered from most kinds of natural disasters except for tsunamis, causing great losses of people, properties, infrastructure, adversely affecting the environment, production and business. According to the Global Climate Risk report, Vietnam is one of the most threatened countries in the world by natural disaster risks. These natural disasters that Vietnam often faces with include: floods, storms, tornadoes, landslides and drought. In 2016, natural disasters caused an economic loss of about VND 40.000 billion to Vietnam and in 2017 the damage was estimated at VND 60.000 billion (General Department of Disaster Prevention and Control, 2019).

Table 1. Economic losses caused by natural disasters in 2009-2018 period (unit: VND billion)

Year	Economic losses caused by natural disasters
2009	23.667
2010	11.700
2011	12.703
2012	16.000
2013	28.000
2014	2.830
2015	8.167
2016	39.726
2017	60.000
2018	20.000

Source: General Department of Natural Disaster Prevention and Control (2019)

Insurance is one of the tools for disaster risk transfer. According to ADB (2015), tools for disaster risk transfer include capital market products, credit and insurance. Insurance and capital market products involve the transfer of risk (means transferring risk to another party for a compensation). Contingency credits, disaster reserves, and contingency budgets allocate costs for disaster response over time with the government in the position of a risk taker. Although the government has invested in strengthening planning, there is a financial shortage after each disaster. Vietnam's current financial capacity only meets about 21% of the need for emergency reconstruction and recovery (World Bank, 2018). In the context of increasingly limited public finance, solutions in the insurance market need to be taken into account to mobilize more resources from the private sector and reduce the burden on the Government budget. However, there are very few disaster risk insurance products in Vietnam. Disaster risks are commonly deployed by insurance companies as an expanded risk content in property, personal insurance and agricultural insurance (Table 2).

Table 2: Disaster risks in insurance operations

Insurance operations	Subjects	Disaster risks
1. Life insurance		
<ul style="list-style-type: none"> - Endowment insurance with term of 5 years and 10 years; - Education insurance; - Life insurance for a limited term; - Life insurance and savings. 	Human	Storms, floods, earthquakes, volcanoes, lightning
2. Human insurance		
<ul style="list-style-type: none"> - Passenger accident insurance; - Labor accident insurance; - Visitor insurance; - Crew members accident insurance; - Student accident insurance; - Human accident insurance; - Driver accident insurance; - Life insurance. 	Human	All disaster risks except earthquake and volcanic
3. Property insurance and damage insurance		
<ul style="list-style-type: none"> - Construction and installation insurance; - Oil and gas insurance. 	Property	Storms, earthquakes, volcanoes, floods, lightning
4. Cargo insurance		
<ul style="list-style-type: none"> - Import cargo insurance; - Export cargo insurance; 	Property	Earthquakes, volcanoes, storms, floods

Insurance operations	Subjects	Disaster risks
- Inland cargo insurance.		
5. Hull insurance and property damage liability		
- Hull insurances; - Property damage liability.	Property	Storms, floods, earthquakes, volcanoes, tsunamis, fog
6. Aviation insurance		
Fuselage insurance;	Property	Storm, lightning, fog
7. Motor vehicle insurance		
Motor property insurance;	Property	Storms, floods, lightning, earthquakes, hail
8. Business interruption insurance		
Business interruption insurance.	Measured benefits by money	Storms, floods, lightning, earthquakes, hail
9. Agricultural insurance		
Insurance of livestock and plants	Livestock and plants	Storms, floods, floods, droughts, pests, cold spells

Source: National institute for finance (2016).

2.1. Disaster risk insurances in Vietnam

i. Specialized disaster risk insurance

Disaster risk insurance is a form of insurance that insurance companies will pay for when a disaster occurs. The compensation reduces the financial impact of external shocks (disaster events), so that the insured's livelihood and business are not put at risk by natural disasters or extreme weather events. Disaster risk insurance covers hazards arising from geological, meteorological, hydrological, climate, ocean, and biological events and their combination. Natural hazards include earthquakes, floods, storms, tsunamis, droughts, snow and ice, etc.

In 2017, specialized insurance products for natural disaster risks began to appear in the insurance market. Bao Viet Insurance Corporation and Munich Reinsurance Company offer One Storm parametric insurance, the first tropical storm insurance in Vietnam. This product protects certain types of fixed assets during construction and operation determined by specific, precise coverage locations (latitude, longitude) both on land and offshore. The insurance company check the compensation immediately after the storm at the site: onestorm.munichre.com, the data is determined and checked by an independent third party which is the Japanese Meteorology Agency (JMA). This insurance product is targeted at large organizations and corporation, power plants, industrial plants and government

agencies. Companies and organizations that buy this insurance not only obtain the insured fixed assets but can also claim for non-physical losses such as reduced profits due to business interruptions, storm prevention costs, expenses for overtime work, expenses for handling losses caused by storms.

ii. Agricultural insurance

Agricultural insurance targets to subjects which are risks arising in the field of agricultural production and rural, including risks associated with crops, livestock and supplies, factory goods and materials. Agricultural insurance in Vietnam has been first operated since 1982, but there was some interruption. On March 1, 2011, the Prime Minister issued Decision No. 315/QD-TTg on piloting the agricultural insurance for the period of 2011-2013. This agricultural insurance was implemented on a limited scale in 20 provinces and cities with the insured subjects include crops (rice), livestock (buffaloes, cows, poultry) and aquatic products (shrimp and catfish). There were 236.396 farmer households participating in crop insurance (including: 76,5% of poor households; 16,8% of near-poor households; 6,7% of ordinary households). For the products of livestock insurance, there were also 60.133 farmer households participating (including: 84,1% of poor households; 9,8% of near-poor households; 6,1% of ordinary households). Fishery insurance has attracted 7.487 farmer households (including: 27,4% poor households, 4% near poor households, 68,6% ordinary households) (Vu Thi Hoai Thu, 2019).

Table 3. Pilot results of agricultural insurance in 2011-2013

Insurance	Number of households and household groups participating	Amount	Insurance value (VND billion)	Insurance premium (VND billion)	Compensation amount (VND billion)	Compensation rate (%)
Rice	236.396 (78%)	65.297 ha	2.151 (28%)	91,919 (24%)	18,9 (3%)	20,6%
Livestock	60.133 (20%)	1.246.714 con	2.713,2 (35%)	83,906 (21%)	13,3 (2%)	19,9%
Fisheries	7.487 (2%)	5.803 ha	2.883,7 (37%)	218,175 (55%)	669,5 (95%)	306%
Total	304.016(100%)		7.747,9 (100%)	394 (100%)	701,8 (100%)	178

Source: Ministry of Finance (2014), cited by Vu Thi Hoai Thu (2019).

The pilot phase of agricultural insurance encountered some difficulties in advocacy, monitoring compliance with production processes, compliance with regulations, technical standards and risk control in the agricultural production process, lack of data management tools. In addition, large insurance values increase the insurance premium, making it difficult

for both parties to participate in insurance. Besides, the risks in agricultural production are very large and frequent, with the increasing density and intensity of natural disasters, insurance companies face with the risk of high losses and encounter difficulties in reinsurance contracts.

After the pilot period, from 2014-2018, insurance companies continue to research and deploy agricultural insurance. By mid-2016, 304.017 farmer households/organizations participated in agricultural insurance with a total insured value of VND 7.747,9 billion (Nguyen Viet Loi, 2018). On that basis, the Government issued Decree No. 58/2018 / ND-CP dated April 18, 2018 on agricultural insurance. On June 26, 2019, the Prime Minister issued Decision No. 22/2019/QD-TTg on the implementation of agricultural insurance policies. Decree 58 applies the principle of voluntariness, not limited to organizations and individuals participating in insurance, subject of insurance, insured risks and geographical areas. The Decree specifies that the insurance beneficiaries will be supported by the agricultural insurance premiums including rice, buffaloes, cows, aquatic products (black tiger shrimp and white leg shrimp) in 20 provinces and cities in Vietnam.

iii. Property insurance

Property insurance covers all operations for which the subject is property or benefits related to the property. In Vietnam, disaster risk insurance for public properties is often provided as part of a package because there is not enough volume and capacity to guarantee risk independently. The fact shows that, for the commercial assets, only large organizations and enterprises participate in property insurance. For the other assets, they mostly are insured by compulsory fire and explosion insurance as prescribed, accounting for a very small percentage of total assets. According to the Insurance Supervisory Authority (2015), the total value of public assets is estimated at nearly 1 million billion VND (excluding infrastructure and other assets of defense and security bodies), managed by all socio-economic sector nationwide. In particular, public assets managed by ministries and central agencies are more than 263,4 trillion VND, accounting for 26,35% in value and 12,44% in quantity. Public assets managed by localities are more than 736 trillion VND, accounting for 73,75% in value and 87,56% in quantity (Insurance Supervisory Authority, 2015).

About 1.000 organizations in Vietnam have purchased public property insurance with a total premium of VND 180 billion (Nguyen Viet Loi, 2018), covering large assets such as satellite Vinasat 1 and Vinasat 2 (1.034 million USD), Son La hydroelectricity (15.066 billion dong), Dung Quat oil refinery (3.300 million USD). However, the proportion of organizations purchasing new public property insurance accounts for nearly 1% of the total organizations managing and using public properties. The insured public property includes buildings, machinery, and infrastructure with a total insured value of 46% (Kim Lan, 2015). Infrastructure works (bridges, roads, dykes, embankments, ditches) have just been insured during the construction period, not yet completed and activated in use.

2.2. Challenges of disaster risk insurance in Vietnam

Although many disaster risk insurance policies have been issued, there are still some issues during the implementation. For agricultural insurance, first, natural disasters are very complicated and difficult to forecast. When they happen, natural disasters have a wide range of impacts, causing great losses to farmers. Consequently, the insurer cannot afford to pay the compensation, especially in aquaculture insurance.

Second, the proportion of individuals participated in insurance is still low, the majority of the participants is poor. The target market for insurance is usually large-scale agricultural production households, but the agricultural production households in Vietnam are small and fragmented, leading to very low capacity to participate in insurance. This explains why the potential of the insurance market is huge but the rate of participation is still low.

Third, taking advantage of poor supervision, some farmers have behaviors of increasing damage to profiteer. For example, they can reduce production costs such as reducing investment in irrigation system, pesticides or not strictly managing production systems. When a natural disaster occurs, insurance companies face with huge amounts of compensation, even beyond their ability to pay. In addition, non-mandatory insurance leads to adverse selection, i.e. people with high risk of damage are more willing to buy insurance than low-risk ones, while insurance companies prefer selling insurance to individuals at lower risk. Therefore, the number of insurance companies willing to participate in the disaster risk insurance market is low.

Fourth, awareness and understanding of farmers on insurance are low. They do not understand the insurance terms, their rights and obligations when participating in the insurance but only care about the conditions and the process of claiming when risks happened. If the premium is high, the farmer will not want to join the insurance. Or if they did buy insurance but not meet the risk at the first year, they would not renew the contract for the following year.

Regarding property insurance, although public property insurance is compulsory, the insured value of public asset is not high; the coverage is not comprehensive; and it does not cover natural disaster risk while this is the type of risk most often causes great damage to public assets. It is apparent that the role of insurance for public property is extremely necessary, because these assets often face with lots of objective risks such as natural disasters, technical risks, fire, collision, etc.

The first reason is that the list of insured public assets tends to be specific to each insurance company, based on the field of the major shareholder being a state-owned enterprise that contributes capital to that insurance company (postage, petroleum, military). Therefore, it is difficult for the beyond insurance companies to access and provide services for these potential customers. Meanwhile, the insurance buyers do not have full information to choose the appropriate insurance product.

Second, in Vietnam, reinsurance companies set a proportional risk limit or provide contracts to eliminate the risk of natural disasters, hindering the domestic insurance market.

The level of penetration of disaster insurance in Vietnam is still low for public, commercial and residential properties as most insurance buyers is large organizations. On the other hand, based on regulation, many properties are not required to be insured (the civil liability of motor vehicle's owner and fire insurance is mandatory), so nearly all public offices have not been insured by property insurance.

Third, on the supplier side, insurance companies still face with difficulties in valuing and determining assets being insured. The risk forecasting and expense estimation for risk prevention and mitigation are still limited due to poor capacity. Therefore, the insurance premium of public property compared to the total asset value is still low, not well-proportioned with the asset value itself. Also, it does not accurately reflect the risks and costs of related damage. Meanwhile, the abnormal changes of the weather put increasing pressure on the insurance industry, causing the burden of compensation to rise unexpectedly.

3. Recommendations for disaster risk insurance in Vietnam

3.1. From the Government

3.1.1. Finalizing the institution on disaster risk insurance

With agricultural insurance, the Government needs to improve the legal framework and policies related to support individuals, businesses, organizations (credit, export). Also, the Government supports the reinsurance for agricultural insurance business. The legal environment and regulations for enforcing insurance contracts are a prerequisite for the development of agricultural insurance. In a clear and transparent regulatory environment, both insurance companies and farmers are assured of participating in insurance. Relevant laws and regulations also need to be in line with international standards, in order to improve opportunities for domestic agricultural insurance companies to access the international market to reinsure and transfer risks.

At the same time, in the first phase, it is necessary to research the level of risk for each object, each region to build up appropriate insurance development policy. Accordingly, the Government should focus on the motto from easy to difficult, select objects with homogeneous and moderate level of risk, simple insurance products which is easy to operate, taking risks easy to control, etc.

With property insurance, it is necessary to provide documents in the field of construction and installation, which specify the types of disaster risk covered. It is possible to buy compulsory insurance for natural disaster risks together with fire insurance such as in France, Turkey, etc. Terms of insurance contracts related to disaster risks should be standardized based on international experience.

In addition, one of the things that needs to be done to improve legal environment is to build human capacity and technical support. The government should issue insurance guidelines or provide technical assistance for individuals and public property management agencies. For example, Australia, Canada, Indonesia, Mexico, New Zealand and the Philippines issued standardized guidelines for public property insurance. The Mexican

government also actively assists local authorities in obtaining appropriate public property insurance. With public property managers, they need training so that they can understand, choose the most updated insurance terms and provide accurate information for the insurance sellers, reducing insurers' uncertainty, thereby providing better insurance terms and conditions or reduced premiums.

3.1.3. Building infrastructure and data systems

Disaster risk insurance requires a reliable infrastructure, especially for weather index insurance. Infrastructure and data are important factors to improve disaster forecasting capacity. It is necessary to develop a quantitative model of natural disaster risks and build a database of natural disaster risks and public assets in order to determine the frequency of natural disasters and the extent of damage, which are all basis of risk calculation and insurance pricing. Also, it is important to collect, maintain, store data and provide data promptly related to covered events. These data should be placed in the public domain because they could be use in different ways by multiple users. Also, data should be made available to everyone, including commercial interests who want to develop weather insurance products or seasonal weather forecasts.

3.1.4. Establishing a disaster risk insurance fund

In the long term, it is necessary to set up a disaster risk insurance fund; building investment mechanism, using disaster risk bonds (Cat Bond) and considering disaster risk insurance as a specialized insurance. During the process of setting up a disaster risk insurance fund, attention should be paid to legal conditions, insurance coverage, loss assessment, risk management, and transparent risk sharing mechanism among the stakeholders.

Regarding the research and development of investment mechanisms and the use of disaster risk bonds (Cat Bond) in Vietnam's insurance market, international experience shows that it is necessary to have a specialized body (like Fonden of Mexico) issues valuable papers, each of which corresponds to different risk categories priced by S&P, Moody's or Fitch, which will be sold to investors in the capital market. Investors of the above valuable papers are hedge funds, disaster funds and asset managers. If a disaster occurs, the participants will receive compensation from the sale of bonds. Disaster-risk bonds have floating interest rates and apply specific conditions related to the main disasters, which is used as an alternative to traditional disaster reinsurance. The advantage of this investment is that the capital market has a larger financial capacity than the insurance market. Besides, some other advantages such as this investment diversify sources of protection over the years; more independent from reinsurance market and prices guaranteed for years; reducing capital costs in some cases (World Bank Group, 2017).

3.1.5. Raising people's awareness of disaster risk insurance

The next recommendation is to raise people's awareness about the importance of insurance, especially for farmers participating agricultural disaster risk insurance. In fact, in many countries including Vietnam, one of the causes of underdeveloped agricultural

insurance is that farmers do not fully understand the mechanisms and the importance of agricultural insurance. Therefore, providing comprehensive information for farmers on agricultural insurance is essential. Although private insurance companies also invest in marketing strategies, they are unlikely to invest at the socially optimal level of providing farmers in general about insurance. In addition, the information that the insurance company provide on the basic and mechanism of insurance will be more subjective and incomplete. Therefore, in order to increase the ability of information to be presented in an equal, objective and comprehensive manner, raising the farmer's awareness about the basis and mechanism of agricultural insurance, thereby helping them understand the importance of insurance to their livelihood and production, it is necessary to have adequate and methodical investment in training and propagating. In order to replicate raising awareness for such insurance products, resources from the government, sponsors and experts are required. With property insurance, it is necessary to provide technical assistance and training to property managers about the roles, types, rights and obligations of participants.

3.2. From the insurance companies

3.2.1. Designing appropriate insurance products

In principle, general insurance products and specialized disaster risk insurance must be clear, transparent and objective; ensuring benefits among involved parties; easily participating and compensating; constantly improving the terms and conditions for the product to match the actual conditions. Especially, insurance companies need to coordinate closely with localities to develop agricultural insurance products. With specialized disaster risk insurance products, it is necessary to continue to promote parametric insurance to both agricultural and property insurance. However, disaster risk needs to be assessed thoroughly to be in line with the extent and scale of risks. In addition, it is necessary to strengthen financial capacity, reinsurance program for disaster risk, along with the development of effective risk management processes and compensation.

3.2.2. Developing insurance distribution channels

Developing insurance distribution channels is an important content to approach the market. The main distribution channels include (a) insurance retail through an intermediary, such as a credit institution (bank, credit fund, etc.) or a material supplier; or (b) directly distributed by the certified agents by the insurance companies. The appropriate channel depends on local conditions and business interests of different stakeholders. It is necessary to choose which channels have an extensive retail network, able to reach a large number of customers to facilitate insurance distribution. For example, credit institutions can link insurance service with their lending operations to reduce default interest rates due to adverse weather events, while material suppliers consider insurance as a competitive advantage for

the products they sell to farmers. If insurance companies have large coverage in rural areas, they should plan direct retail sales of insurance products. In this case, consideration should be given to assessing the ability of farmers to purchase disaster risk insurance products independently, as experience has shown that it is easier to sell disaster risk insurance when linked to a loans or input materials.

Regardless of the retail model, the insurance company must be able to access reinsurance services, usually at an appropriate international level. The transactions in index-based insurance are very likely to be covariate risk and in the event of a natural event triggered, the amount of compensation payments tends to be very large.

3.2.3. Collecting weather data and building a data transfer process

With disaster risk insurance, especially parametric insurance products (based on weather indicators), insurance companies need local weather data. Data used to build basic weather indicators must comply with these requirements:

- Reliable daily collection and reporting procedures;
- Periodic inspection and quality control;
- An independent data source for verification (for example, surrounding weather stations, WMO Global Telecommunications System). For instance, Bao Viet has activated the compensation right after the occurrence of a natural disaster event with data verified and checked by an independent third party, JMA (Japan Meteorological Agency).

3.2.4. Implementing marketing strategies

Marketing strategies to approach potential customers, end users and intermediaries must be designed in detail. In marketing strategy, it is important to transfer complete information about disaster risk insurance to customers even if they do not buy insurance directly from the insurance company. Especially with agricultural insurance, farmers are often unfamiliar with insurance. They need to be exposed to the basic concepts of insurance and specific features of insurance to fully understand the contract such as the claim process and payments. The process of transferring information promotes general financial knowledge and awareness of risk reduction for insurance buyers.

4. Conclusion

Disaster risk insurance in Vietnam is still limited which there is only one specialized product and other traditional insurances integrated the content of disaster risk insurance. Although the application of agricultural and property insurance in Vietnam has been for many years, it still has many limitations. Therefore, it is necessary to implement some solutions both by the Government and insurance companies to boost the disaster risk insurance market in Vietnam, meeting the requirements of effective support for prevention and mitigation of natural disaster risks.

5. References

1. ADB (2015). *Strengthening city disaster risk financing in Vietnam*. Asian Development Bank, accessed 13 May 2020 from <https://openaccess.adb.org>.
2. Insurance Supervisory Authority (2015). Presentation in Workshop Public Property Insurance: Mobilizing resources from the insurance market to financial protection, State Budget, July 18, 2015. Hanoi.
3. Kim Lan (2015). Insurance gaps for high value public assets, Stock Investments, accessed 15 May 2020 from <https://tinnhanhchungkhoan.vn/bao-hiem/khoang-trong-bao-hiem-cho-cac-tai-san-cong-co-gia-tri-lon-127014.html>
4. Nguyen Viet Loi (2018). Financial policy and disaster risk insurance in Vietnam. Financial magazine, accessed 15 May 2020 from <http://tapchitaichinh.vn/nghien-cuu-trao-doi/trao-doi-binh-luan/chinh-sach-tai-chinh-va-bao-hiem-rui-ro-thien-tai-o-viet-nam-134137.html>
5. Financial magazine (2017). *The necessity of special disaster risk insurance*, accessed 13 May 2020 from <https://www.pjico.com.vn/rui-ro-thien-tai-can-mot-loai-hinh-bao-hiem-rieng-biet.html>
6. General Department of Disaster Prevention and Control (2019). *Damage statistics*, accessed 20 March 2020 from <http://phongchongthientai.mard.gov.vn/Pages/Thong-ke-thiet-hai.aspx>.
7. Vu Thi Hoai Thu (2019). Chapter 8: Agricultural Insurance in the Mekong River Delta in Vietnam, in Tran Tho Dat & Vu Thi Hoai Thu (eds). *Climate Change and Agriculture: Status, Impact, Adaptation and Insurance in the Mekong River Delta in Vietnam*. Publisher of National Economics University. Hanoi.
8. World Bank Group (2017). *Financial Risk Management of Public Assets Against Natural Disasters in APEC Economies*. Report submitted for consideration. 24th Finance Ministers' Meeting, Hoi An, Viet Nam.
9. World Bank (2018). Speech at the National Conference on Disaster Risk Management, 3/2018. Hanoi.

Acknowledgment

This research is implemented in the framework of the Project “Valuation of economic losses caused by extreme hydro-meteorological phenomena in the context of climate change and proposed risk management solutions for coastal provinces of Central Vietnam” (Code BDKH 22/16-20) funded by the National Program on Science and Technology to Respond to Climate Change, Management of Natural Resources and Environment during 2016-2020 for the National Economics University.