



XL Reinsurance

Disaster Recovery Case Studies Vietnam 2017: Typhoon Damrey

In cooperation with

Centre for
Risk Studies



UNIVERSITY OF
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2017: Typhoon Damrey

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Introductory Commentary

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The important role of (re)insurance in the speed of physical and economic recovery after a major disaster, especially when there is little to no coverage due to unavailability, insufficient capacity or lack of take up (predominantly because of economic reasons), has not really been studied in detail. The (re)insurance industry tends to focus on the potential for future events and events in the immediate past. However, there is a need for a deeper understanding of the aftermath of disasters over a longer time frame, as well as an understanding of the impact that insurance penetration has on the pace of economic recovery.

Working with Cambridge Centre for Risk Studies at the University of Cambridge Judge Business School (CCRS) we have been examining more than 100 catastrophes across the world over a three-year timeline to compare and contrast outcomes and establish conclusions and recommendations. A consolidated report will be released later in 2020 but the case studies (this one covers 2017 Typhoon Damrey) produced by CCRS were so interesting and of such quality we thought it would be beneficial to share these as they became available. In the future we intend to make available publicly all of the detailed work from all of the case studies in an open source database whilst also establishing a template to study and collect data from future catastrophes in a more structured way.

Our aim is for this work to be used as a tool by policymakers and governments worldwide when evaluating disaster preparedness and seeking to fully understand, from the lessons learned by others, the impact of displacement of populations; increasing personal debt levels; change in economic mix of industry; political upheaval and overall time to recover, among other things. Intuitively, we know the speed and scale of protection the (re)insurance industry provides dramatically reduces the recovery time for communities which have suffered through extreme catastrophes. However, we believe that it is imperative that this be demonstrated in more detail with evidence and placed in front of the right people to effect change – particularly governments.

We also want to explain the marginal increased cost in relation to the value of rebuilding with resilience – what we call “building back better” – over and above the cost of replacement. The (re)insurance industry needs to provide extra limit and contractual stipulations for “building back better” to minimize the impact of future disasters. In addition to this, we want to demonstrate the importance of “building better before”, that is encouraging our partners, including governments, through funding with NGOs, banks and other bodies to retrofit properties and strengthen vulnerabilities to avoid losses in the first place. This should result in savings on future insurance costs which would more than finance the initial upfront investment.

We are starting to see good progress in terms of the increased role of governments in closing the gap between economic loss and insured loss – since we started these papers we have seen the FEMA program in the US placed in the market for the first time; Flood Re in the UK become fully operational and the California Wildfire Fund established by the State of California and managed by the California Earthquake Authority (CEA), at least initially. The current pandemic is another unfortunate example of the difference between economic risk and insurance coverage with many businesses not prepared and not covered for what is a foreseeable peril. The enormous exposure made clear in the COVID-19 pandemic is far greater than the (re)insurance industry’s capital base and future coverage can only be provided with governmental assistance. AXA XL Reinsurance are formulating ideas for possible future structures based on our work understanding Government Pools in 2018 and will be sharing this work in due course.

There are discussions happening in numerous countries within the industry about working with government to provide some form of pandemic coverage. This work together with the more recent schemes where governments are de-risking are encouraging and signs of the partnerships being built up between governments and the industry. We will continue to support these initiatives with reinsurance and by sharing our findings from studies such as these.

The views, findings and opinions in this case study are those of the researchers at CCRS and not necessarily those of AXA XL. Notwithstanding this, we are proud to be associated with this project and are sure that by gaining a greater level of understanding, we will ultimately develop more catastrophe reinsurance solutions and, more importantly, show the world the true value and social benefit of (re)insurance.

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Abstract

In November 2017, Typhoon Damrey made landfall in the Vietnamese province of Khánh Hòa on the south-central coast as a strong Category 2 (SSHWS) tropical cyclone. Damrey was the second deadliest storm of the 2017 Pacific typhoon season and was the strongest typhoon to strike the region since Typhoon Lingling in 2001. Strong winds, heavy rainfall and severe flooding in central Vietnam killed 142 people and caused damage of approximately US\$1 billion. Khánh Hoà Province was the most severely affected province, experiencing nearly two-thirds of total national losses.

This case study examines the impacts of the typhoon in Vietnam – a lower-middle income developing economy with relatively low non-life insurance penetration – and the subsequent socioeconomic recovery. The study draws on material from a World Bank mission to Khánh Hòa in March 2018, five months after the disaster. Fieldwork included detailed assessment of damage and reconstruction needs for housing, as well as of agriculture, irrigation and flood control, and transport.

Vietnam is highly exposed to natural hazards, including typhoons and floods which are the most frequent and devastating events. The country endures an average of 6-8 typhoons each year, and an estimated 70% of the population live in exposed coastal areas. Damrey exhibited an abnormal southerly track to hit Khánh Hòa, causing extensive damage to housing and agriculture. Over 118,000 homes were damaged, together with fisheries, forestry, and orchards. Vietnam has been experiencing exceptionally fast annual economic growth of 7-8% since the late 1980s, and Typhoon Damrey had a negligible effect on economic output or growth at a national level. Income losses were insignificant and losses to residential buildings were largely assumed by individual householders. However, the regional economic impacts were visible, and 2018 growth projections for Khánh Hòa were revised down from 7.6% to 6.7%.

Recovery was exceptionally quick in all sectors except agriculture. Nearly 90% of homes were repaired or rebuilt within four months of the disaster and irrigation/flood control and transport infrastructure was largely complete within 12 months. This is despite state aid for reconstruction being limited to less than 2% of the total requirement for housing, 30% for irrigation, and 50% for transport. There has, however, been little or no attempt to build back better and incorporate resilience measures in the recovery process.

Insurance played a negligible role in recovery since insurance penetration is very low in Vietnam. Communal capital is important in recovery, and informal loans from family and friends are critical financial aids. However, as Vietnam urbanises and grows in wealth towards a market-dominated economy, the role of communal self-help may diminish, presenting an opportunity for insurance. In particular, there appears to be scope for an increased role of business continuity insurance, for example for larger fisheries and agricultural enterprises.

Section 1: Event Context

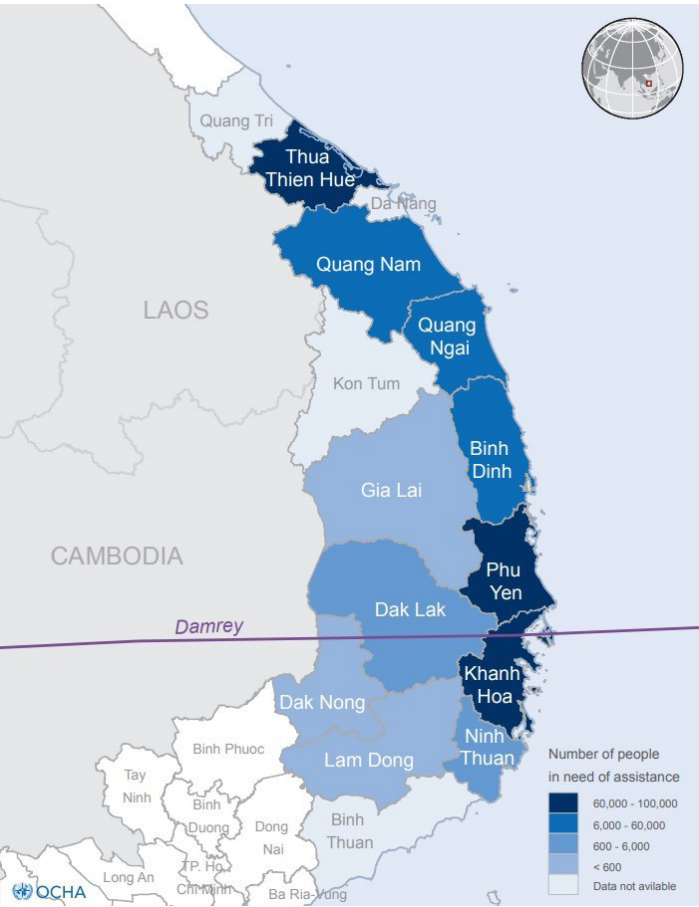


Figure 1: Trajectory of Tropical Cyclone Damrey on 4th November 2017 taking an exceptional southern route over Khánh Hòa and Đắk Lắk provinces (as of Nov 2017) (UNOCHA 2017)

Event Overview

Typhoon Damrey originated in the Philippines and tracked across south-central Vietnam. It was a strong Category 2 (SSHWS) tropical cyclone that reached its peak strength over the China Sea, with one-minute sustained winds of 165 km/h (105 mph).¹ It then made landfall over Khánh Hoà province, Vietnam at 10am on Saturday 4th November as its convective structure started to wane (Figure 1).

Damrey was the second deadliest storm of the 2017 Pacific typhoon season and was the strongest typhoon to strike South-Central Vietnam since Typhoon Lingling in 2001. Strong winds, heavy rainfall and severe flooding in Central Vietnam killed 142 people and caused damage of US\$1.03 billion.² Khánh Hoà Province was most affected with US\$648m of damage; nearly two-thirds of the total losses (Table 1).

Damrey was distinctive not only for its strength, but also for its abnormal storm track. Typhoons rarely have made landfall on the southern coast – the majority of storms track further north over Hainan and Hanoi – but Typhoon Damrey hit the southerly Khánh Hòa province and then continued to move inland through Đắk Lắk. While it remains hard to directly attribute any storm to climate, Damrey’s track is notable in the context of climate change, with assessments of future hazards suggesting greater intensity of typhoons, as well as events with less predictable and increasingly southerly tracks.³

Table 1: Damage in Vietnam by Province

Province	Loss US\$m	% of Total
1. Quang Tri	11.5	1.1%
2. Thua Thien-Hue	0.0	1.4%
3. Quang Nam	37.2	3.6%
4. Quang Ngai	0.0	4.2%
5. Binh Dinh	0.0	3.8%
6. Phu Yen	146.7	14.4%
7. Khanh Hoa	660.7	64.8%
8. Gia Lai	8.3	0.8%
9. Dak Lak	0.0	3.6%
10. Kon Tum	6.1	0.6%
11. Dak Nong	8.9	0.9%
12. Lam Dong	7.5	0.7%
Total economic loss	1.02bn	100%

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1 JTWC 2017
2 Phuong 2017
3 Lap 2019

The impact of a hazard event such as typhoons are determined not only by the strength of the storm but also by the pre-disaster vulnerability of the population living in the area and how directly exposed people are to the event. The impacted districts varied widely in their pre-disaster vulnerability in terms of poverty, housing quality, and preparedness. This may in part help explain why inland districts, with high rates of poverty, sustained damage on par with coastal areas more directly hit by the storm.⁴

More than 3,700 homes collapsed or were washed away and 118,402 houses were damaged or lost their roofs; 10,400 hectares of rice and 30,400 hectares of other crops, including pomelo, cashew and coffee, were damaged.⁵

Socioeconomic Context

Since the implementation of the Doi Moi policy in 1986, the shift from a centrally planned to a market economy has transformed Vietnam from one of the poorest in the world into a lower middle-income country. Vietnam’s development over the past 30 years has been remarkable and the country now is one of the most dynamic emerging economies in East Asia.

Despite Typhoon Damrey, Vietnam’s economic performance in 2017 was strong, reflecting robust export-oriented manufacturing, strong domestic demand, foreign investment and a gradual rebound in agriculture. GDP growth was nearly 7% in 2017 – the fastest expansion in the past ten years⁶ and per capita income has been growing year on year.⁷ Nevertheless, there was a noticeable impact on GDP growth in Khánh Hòa Province where growth in 2018 fell from 7.6% to 6.7%, which corresponds to losses of US\$22m.

Vietnam has been experiencing exceptionally fast annual growth of 7-8% since the late 1980s,⁸ and its medium term economic outlook is also positive; macroeconomic stability is expected to be sustained over the medium term and growth is projected to stabilise around 6.5% while inflation is projected to remain moderate.⁹ Although Vietnam has seen remarkable economic achievements over the last 25 years, poverty remains prevalent

4 UNDP 2018
5 Phuong 2017
6 General Statistics Office 2018
7 Statistica 2018
8 Van Trotsenburg 2014
9 World Bank 2018a

and the economy is heavily dependent on agriculture, with 70% of the population living in rural areas.

Vietnam is experiencing rapid demographic and social change. After years of growth, Vietnam’s population reached 95 million in 2017 (up from about 60m in 1986) and is expected to expand to 120m before tailing off around 2050. Currently, 70% of the population is under 35 years of age, with a life expectancy of close to 73 years. There is an emerging middle class – currently accounting for 13% of the population but expected to reach 26% by 2026.

Over the last thirty years, the provision of basic services has improved. Vietnam is today a significantly more educated and healthier society than it was twenty years ago. It is also a fairly equitable society and learning outcomes in primary school are high as evidenced by the high scores in the Program for International Student Assessment (PISA), where the performance of Vietnamese students exceeds that of many OECD countries. Access to household services has improved dramatically. In 2016, 99% of the population used electricity as their main source of lighting, up from 14% in 1993. Rural access to clean water has also improved, up from 17% in 1993 to 70% in 2016. Access to these services in urban areas is above 95%. Gender gaps are narrowing and there are more female students than male at the upper secondary and tertiary education levels. Female economic empowerment has also steadily improved over the past decade and there has been an upward trend in the share of women in wage work, mostly driven by increased employment opportunities for women in foreign-owned export-oriented factories.

Khánh Hòa is the second most developed province of central Vietnam. It has a relatively small agricultural sector, and strong industry and services. Khánh Hòa is one of the few provinces with a higher gross output in fishing than in agriculture. This is mostly due to the large number of aquaculture farms in the province, which make up around two thirds of the fishing output. The province is endowed with beautiful natural landscapes and beaches, which, with its Cham heritage, attracts a large number of tourists.

Risk Landscape

Vietnam has 3,230 km of coastline and has a long history of coping with natural disasters including typhoons, storm surges, flash floods, landslides and drought.¹⁰ Approximately 70% of the population and 59% of the land area is vulnerable to disasters, particularly storms and floods. Vietnam is hit by more than an average of 6-8 storms and three floods per year (Figure 2) and most of these result in high economic and human losses. Vietnam loses about 1-3% of its GDP to natural disasters annually¹¹. In total in 2017, a fairly typical year, natural disasters caused 390 deaths and 657 injured; 8,500 homes collapsed or were swept away, 611,100 houses were flooded or lost their roofs and the total damage was US\$2.3 billion.

Fatality and economic loss data due to floods and storms is collected by the Department of Dike Management and Flood Control of Vietnam¹² and the Asian Disaster Reduction Centre provide data for the top 25 Vietnam flood disasters in the twentieth century¹³. Combining these data gives a summary of the losses due to floods and storms since 1953¹⁴. (See Figure 3).

10 Chaudhry and Ruysschaert 2007
11 World Bank 2017a
12 DDMFC 2007
13 ADRC 2006
14 Mai & Gelder 2014

Figure 2: Vietnam is hit on average by 4–5 storms per year (Trung, 2013).

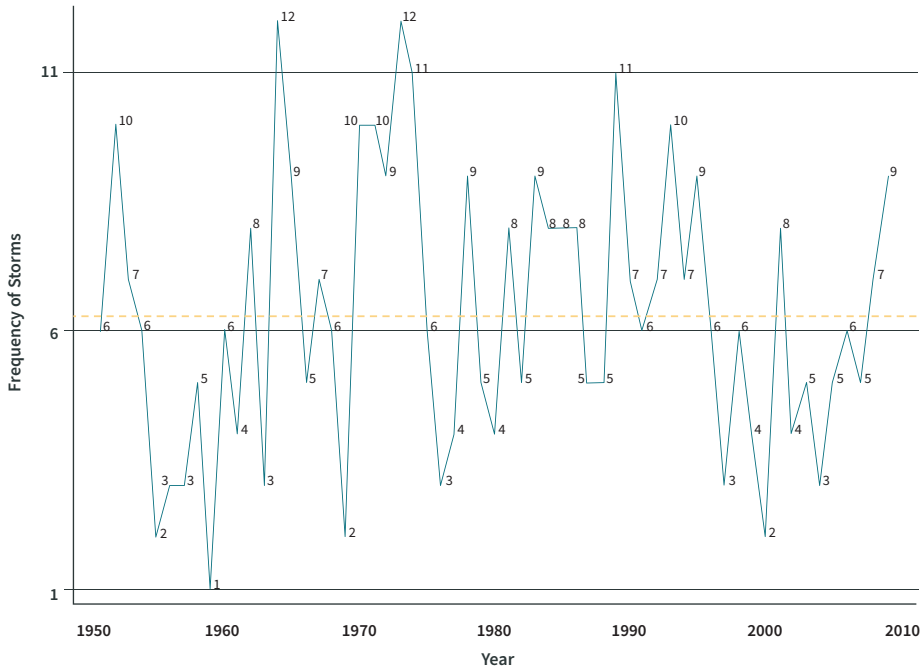
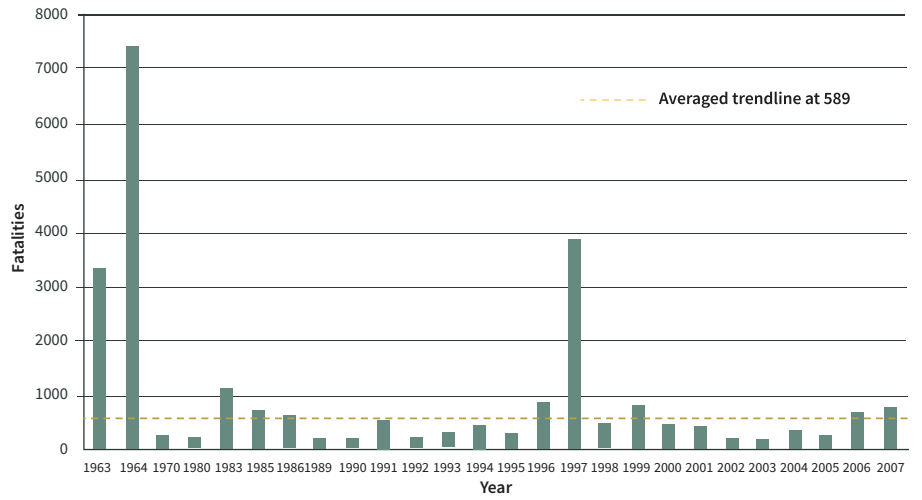
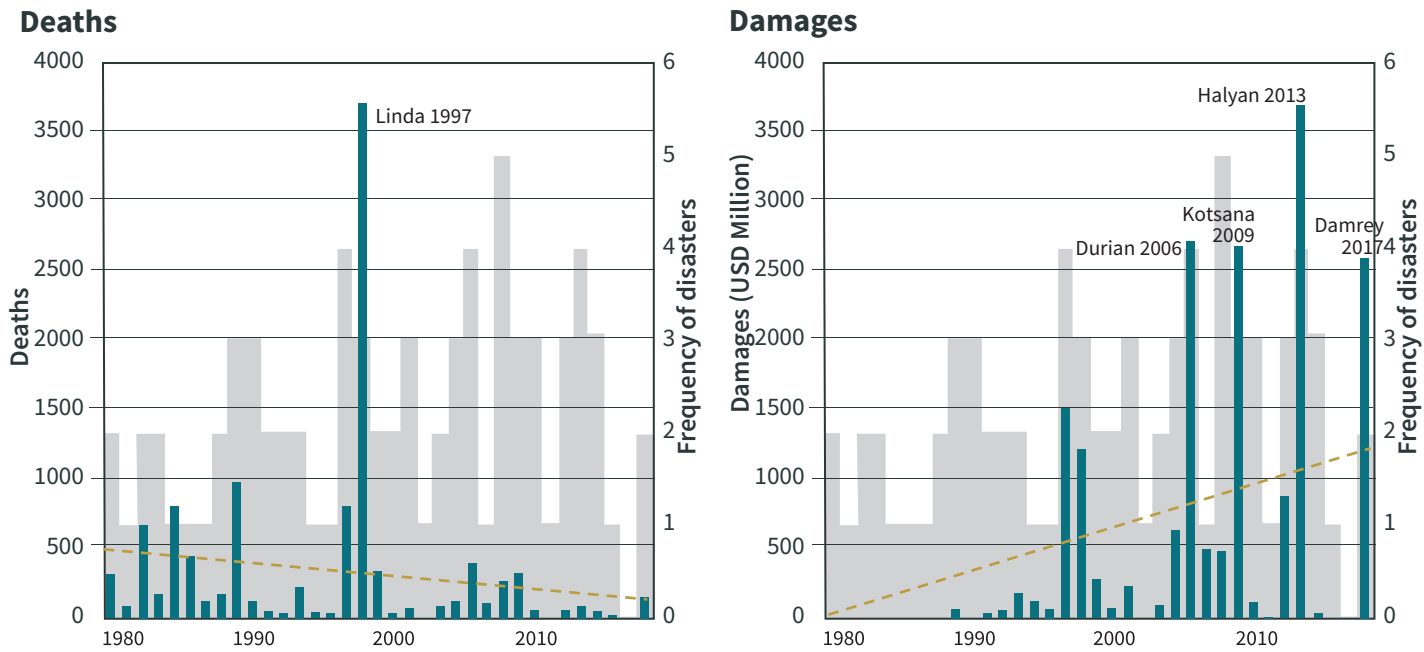


Figure 3: Historic flood and storm fatalities in Vietnam (DDMFC 2007; ADRC 2006).



Vietnam is highly vulnerable to climate change.¹⁵ The World Bank has ranked Vietnam as one of five countries most likely to be affected by climate change; the country is ranked third in terms of the impact of sea level rise and intensified storm surges after Indonesia and China.¹⁶ In the central provinces, flood risk appears to be increasing in intensity as average rainfall and the return period of storms increases.¹⁷ The degree of exposure has also increased in the recent years as a result of an increase in population density in hazard prone areas.¹⁸ Most of the population live in coastal areas, the majority being located in the Red River Delta in the north and in the Mekong Delta in the south.¹⁹ This coastal population is particularly vulnerable to typhoons and floods since the majority live around one metre above sea level.²⁰ The remaining three-quarters of the country are mountainous and suffer from flash flooding. As a result, about 80% of the population of Vietnam is at risk of storms and floods. In line with the pattern of natural disasters worldwide, the number of fatalities has been falling since 1980 whereas the damage and loss has been rising (Figure 4).

Figure 4: Typhoons in Vietnam 1980-2017 (EM-DAT, 2018).



15 Dasgupta et al. 2009
16 World Bank 2010; Trung 2013
17 Reynaud et al. 2012
18 Pilarczyk and Nuoi 2005
19 GFDRR 2018
20 Mai et al. 2009
21 Luu and Medling 2017

Section 2: Disaster Impacts

Research Approach

The Cambridge Centre for Risk Studies conducted extensive research into the impacts of tropical storms and the characteristics of storm recovery. This research comprised a desk study and fieldwork in 2018.

This case study draws on material from a World Bank mission to Khánh Hòa, the province most affected by Typhoon Damrey, in March 2018 five months after the disaster. One of the authors of this case study conducted fieldwork to assess damage and reconstruction needs for housing. Other experts on the mission focused on agriculture, irrigation and flood control and transport. A report of this mission is available on the World Bank website.²²

Physical Impacts

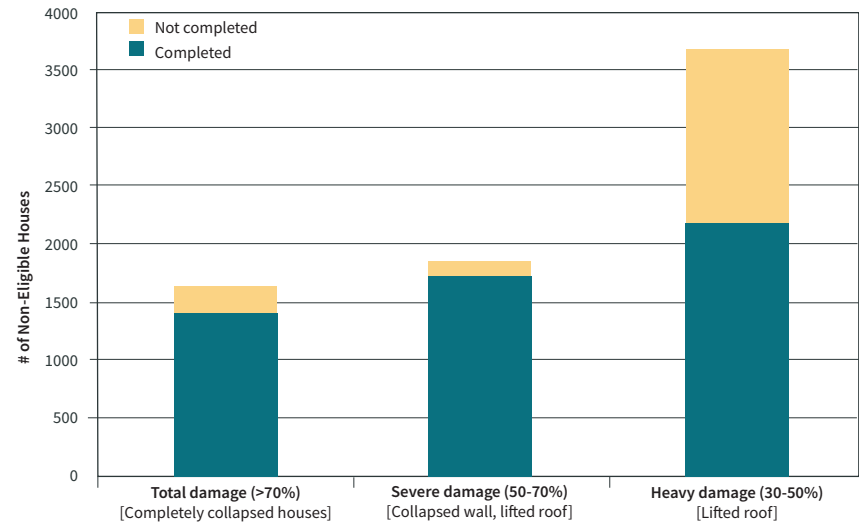
Housing

Typhoon Damrey damaged a total of 118,402 houses²³, of which over 80% were in Khánh Hòa Province.²⁴ 2,817 houses were totally destroyed and needed rebuilding, and the rest suffered various levels of repairable damage. The high damage rate in Khánh Hòa is due to being in the direct path of the typhoon and having a relatively high proportion of semi-permanent houses (50%). As to be expected, damage was more severe in northern districts where the storm hit hardest, in semi-permanent and temporary houses, and in houses on exposed sites on coast or open country.

The total reconstruction costs were estimated at US\$303m. However, state resources available for reconstruction are insufficient to provide support to all families with damaged homes and the Vietnam Government therefore targeted support to those most in need, limiting eligibility to poor, near poor and disadvantaged families. A total budget of US\$2.5m was allocated from central funds plus an additional US\$1.8m from the Fatherland Front. This was sufficient to rebuild 1,655 houses (about 59% of all destroyed houses) and repair 5,516 houses that suffered severe or heavy damage (about 9% of all houses with severe or heavy damage). Families ineligible to receive funding, the vast majority, used their savings or borrowed from family and neighbours.

By March 2018, only four months after the typhoon, nearly 90% of eligible houses had been rebuilt or repaired and about 50% of non-eligible houses (Figure 5). The Department of Construction together with an NGO, the Development Workshop France (DWF), provided guidance on building back better to eligible households. It is not clear, however, that non-eligible households received advice and it is likely they were built back to pre-disaster standards.

Figure 5: Progress in housing reconstruction four months after the disaster.



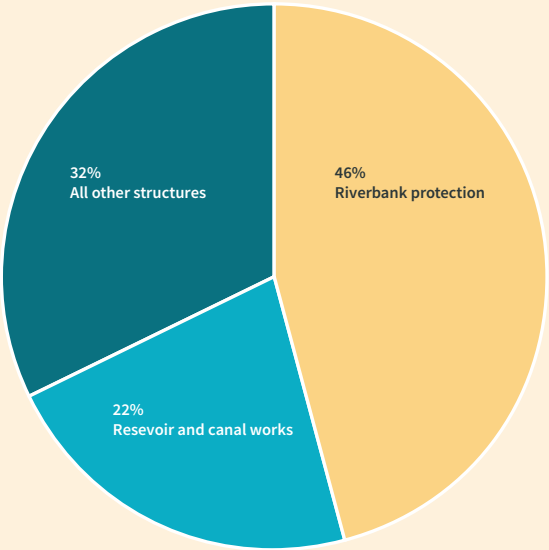
22 Dzung 2018
23 Platt 2018
24 UNDP 2018



Infrastructure - Irrigation and flood control

Hydraulic structures for irrigation and flood protection in Vietnam include reservoirs, canal systems and riverbank protection. These provide water for farmers as well as bulk supply to urban water supply companies and to commercial/industrial areas. The hydraulic structures are vulnerable to erosion from heavy rainfall and floods, but less to high winds. Damage to hydraulic structures from Typhoon Damrey total US\$18m. Most of the reconstruction costs were for failed riverbank protection (46%), reservoir and canal works (22%), and other structures (32%). Funding for reconstruction of hydraulic structures totalled US\$5.4m, just 30% of the requirement. This shortfall added significantly to the backlog of deferred maintenance, which totalled about US\$60m. Priority was given to maintenance works to safeguard life and property, with safety of reservoirs paramount. The provincial master plan for 2016-2020 allocates US\$334m to address this backlog and upgrade infrastructure. There may be a need to improve master planning for hydraulic structures to take account of climate change, rapid growth in urban populations, and commercial and industrial zones expansion which place increasing pressure on scarce dry season water resources.

Vietnam Damrey 2017: Hydraulic Structure Damage Cost Allocations for Repair Estimated US\$18m



US\$18m

Damages to hydraulic structures

US\$5.4m

Funding received. This shortfall added significantly to the backlog of deferred maintenance, which totalled about

US\$60m

Transport

Vietnam has a long coastline as well as hilly and mountainous terrain and road construction, changes in land use and the impact of climate have exposed the country to increased landslides. Every year, during the rainy season, soil or rock failures affect the roads. Many communes lack good roads, and for many, connectivity to the cities is limited or non-existent. Some low-lying communes get totally flooded and get marooned following heavy floods and roads get disconnected.

The extent of damage to transportation infrastructure following Typhoon Damrey was relatively small, most being caused by water flows and floods following rainfall after the typhoon. Floodwater damaged bridges, causeways, culverts, abutments, and embankments and caused landslides damaging and blocking the roads. Road communication was disrupted and the provincial, district and commune departments of transportation took immediate actions to restore road connectivity by using contingency funds. The estimated damage to transportation infrastructure was US\$7m.²⁵ Because damages were very low the province decided to rehabilitate the damaged infrastructure to the pre-disaster conditions rather than improve resilience. The current allocation of funds for rehabilitation is US\$3.4m, only 50% of the total required.

Other infrastructure

There was relatively minor damage to non-domestic buildings, including schools, government offices and hospitals and clinics. These tend to be well built and sited in safe places outside flood prone areas. There was also only minor damage to the industrial, commercial and tourism sectors.

Social Impacts

The floods directly affected over four million people, at least one million of whom were children. Over 30,000 people were displaced and 400,000 people needed support. 142 people died, 197 were injured and 25 were missing. 118,000 homes were damaged or destroyed. Many of the poorest farmers had their fields destroyed, and their harvest and crops damaged.

Economic Impacts

Vietnam has seen exceptionally fast economic development in recent decades, with annual growth rates of up to 8% and per-capita income growing strongly, and is in the process of transitioning towards a market economy. At the macroeconomic level, Typhoon Damrey had little effect on economic output or growth at a national level. Income losses were not significant and much of the costs were incurred by private housing stock. Recovery funds were been pledged by the Government to provide a portion of recovery costs, which have been phased over multiple years since the event and so the fiscal burden of recovery is manageable when compared to the national GDP.

At the regional scale, the affected Khanh Hoa Province is also experiencing growth and transformation in various economic sectors. An increase in large scale industrial projects in the Van Phong Economic Zone is visible, while an increase in tourism has been supported by a new airport and investment in hotels and tourist infrastructure. Changes in agriculture are also evident, with a transition from staple crops towards cash crops, and from deep sea fishing to fish farming. An example of economic growth and the shift from staple rice cultivation to internationally marketable products can be seen in the growth of shrimp production.

There was, however, a noticeable economic impact in Khanh Hoa Province where growth in 2018 fell from 7.6% to 6.7%, which corresponds to losses of \$22 million. Agriculture, which contracted by 5% to 2.6% was the most affected sector as a result of physical damages and loss of crop yields, while other sectors continued growing in 2018. Based on projections in the immediate aftermath of the event, growth in the construction sector was expected to reduce provincial GDP losses by 0.9% and even stimulate medium-term growth.

25 Bulu 2018

Section 3: Disaster Management and Resourcing

Disaster Management

The Vietnamese coast is hit almost every year by typhoons and the people living in coastal areas are relatively aware of and prepared for the risk of flooding. Deep flooding of over one metre is limited to an area of 1-3 km from the coastline and people know they may die if they stay in their homes and don’t reach shelter; this leads to high evacuation rates (90-98%). The authorities evacuate vulnerable people, children and the elderly, and the rest of the population moves to safety inland.²⁶ Local authorities usually coordinate these evacuations. Only the young males stay to take care of property and direct recovery. This means that only a fraction of the total population in the hazard zone is at risk and mortality due to coastal flood events is less than 1%.²⁷

The Government of Vietnam (GoV), together with the UN and other development partners, initiated a fast, coordinated response in order to address immediate humanitarian needs. On 6th November, the GoV officially requested the UN to provide recovery support. The Inter-Agency Joint Rapid Needs Assessment undertaken by the UN, GoV, and civil society organizations, was completed on 16th November 2017.²⁸ It identified housing and livelihoods as the most urgent needs of impacted communities.²⁹ The UN in Vietnam received US\$4.2m from the UN Office for the Coordination of Humanitarian Affairs through the Central Emergency Response Fund (CERF) to support relief activities. Support was also received from OCHA Emergency Response Fund, the Vietnam Red Cross, and other NGOs including World Vision, Save the Children, CARE, Plan and other nations, including the Korea, Japan, United States, New Zealand, and Russia.

Authority

Government control in Vietnam is comprehensive and far-reaching. Overall authority for disaster management is with the Department of Flood Control of the Provincial Government. The Ministry of Labour, Invalids and Social Affairs was responsible for defining the criteria for eligibility for government support, and the Department of Construction was responsible for providing construction advice to builders rebuilding or repairing homes with government grants. The Vietnam Red Cross and the UNDP were responsible for managing various housing reconstruction projects.

26 Mai Van 2014
27 Jonkman 2007
28 UN 2017
29 UNDP 2018

Financing

The priorities for support were determined by commune and local district, which prepared lists of households eligible for support. The Red Cross verified these lists and their fit with the allocated aid budget. They also managed contributions from the house owner, since in most cases government support only partially covered the cost of repair and owners could also pay extra and extend the size of the house. The builder was paid equal instalments in two stages, the Red Cross certifying when the foundations had been completed and when the work had been finished.

State aid only covered a fraction of the total construction needs. Table 2 summarises the amount of state aid by sector as a proportion of the estimated reconstruction cost. Between a third and a half of the estimated reconstruction costs of irrigation and flood control and transport infrastructure have been met, although this doesn’t include a significant backlog in maintenance. Less than 2% of housing reconstruction needs were met by the state and there has been no aid for agriculture, forestry, or fisheries – the main economic sectors affected by the typhoon.

Table 2: State aid by sector

Sector	Aid US\$m	Proportion of need
Housing	4.3	1.5%
Agriculture	None	0%
Irrigation / flood control	5.4	30%
Transport	3.4	50%
Non-domestic buildings	None	0%

Section 4: Recovery and Resilience

Overview

Recovery is defined as a return to normality and an attempt to bring the post-disaster situation to some level of acceptable performance. However, a post-disaster ‘normal’ may not be a return to the same status as before the event, especially if safety and amenity could be improved to enhance resilience and achieve a new normal. Recovery from disaster can therefore be viewed as a process of resilience building, whereby the capacity of a community to spring back after the initial shock of a disaster is increased. Floods can act as catalysts for human adaptation and there is a ‘window of opportunity’ in the early phase of recovery to improve resilience or ‘build back better’. Therefore, although there is a strong imperative to recover quickly and get people back home and business back in operation, a balance must be achieved between speed and enhanced resilience.

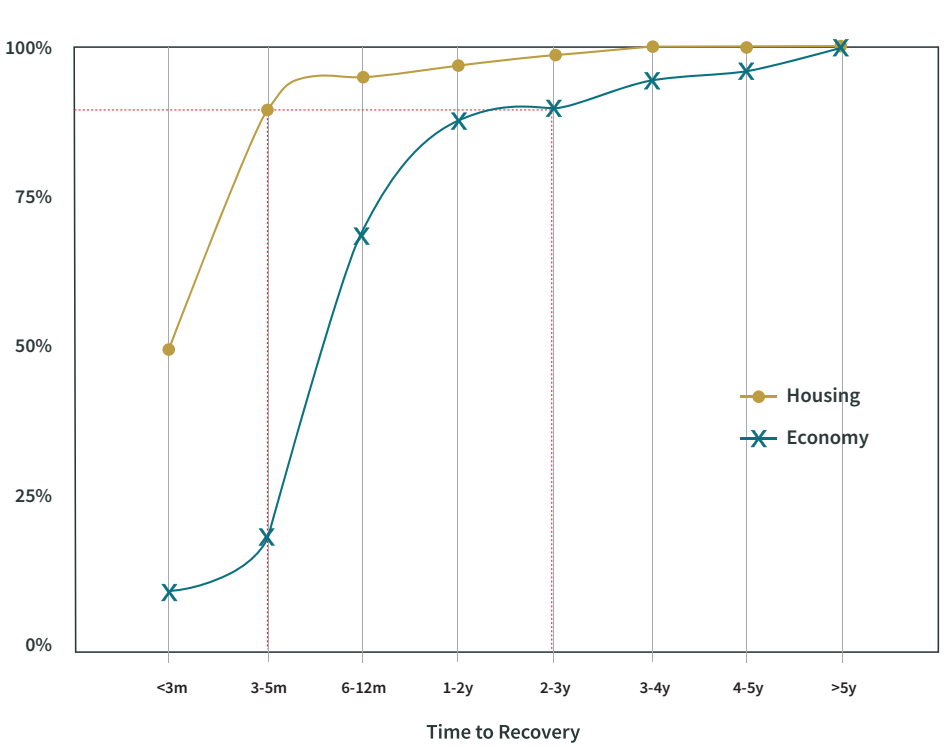
Speed of Recovery

Recovery after Typhoon Damrey was remarkably quick and over 90% of displaced families were rehoused within four months and infrastructure, including roads and hydraulic structures, were repaired within 12 months. Only the agriculture sector took longer to recover. In part this was due to the lead in times for agricultural products and fisheries to become productive. For example, newly planted pomelo trees take four years to bear fruit and shrimp and lobsters need 6-9 months from larvae to reach marketable size. Table 3 and Figure 6 shows the speed of recovery as estimated by the author from field mission observation and interviews. Only the agriculture sector will take longer than 12 months to recover better than 90%.

Table 3: Speed of recovery

Sector	Months to recover ≥90%
Housing	5
Economy	24
Employment	5
Population	1
Infrastructure	12
Non-domestic buildings	0

Figure 6: Speed of recovery



Quality of Recovery

Although recovery is defined as “returning to a normal state after a period of difficulty” that return to ‘normal’ may be undesirable if the quality of a system could be improved to enhance resilience.

Floods can act as catalysts for human change and there is a ‘window of opportunity’ in the early phase of recovery to improve resilience or ‘build back better’.³⁰ The ‘window of opportunity’ for accomplishing post-disaster improvements is narrow; in Vietnam this may be as short as six months after an event.³¹ Remarkably little attempt, however, was made to build back better after Typhoon Damrey. Field surveys 5-6 months after the storm showed that, at the time, there was little if any attempt to build back better, and consequently negligible improvement in the state of resilience. In part, this is because typhoons are regular rather than exceptional events, so people accept them a part of the natural cycle, and because the country is still relatively poor and cannot afford improvements.

The failure to build back better was especially evident in the housing sector, where the majority of homes were rebuilt without government support or advice. The Department of Construction produced plans for two modest storm-resistant homes of 21 m² and 25 m² and provided advice as part of the package of support, but since only 6% of damaged homes received government support this advice didn’t extend widely.

30 Johnson, Tunstall, and Penning-Rowsell 2005
31 Platt and So 2017

Floods can act as catalysts for human change and there is a ‘window of opportunity’ in the early phase of recovery to improve resilience or ‘build back better’.



Section 5: Discussion

There are initiatives by international agencies to improve resilience. A French NGO, the Development Workshop France (DWF) has, since 1989, promoted the preventive strengthening of existing houses in Vietnam by training artisans and community leaders in the application of ten principles of typhoon and flood resistant domestic design and construction. In 1999, these ideas were yet to be widely acknowledged. In 2006, when Typhoon Xangsane destroyed 20,000 houses and unroofed 250,000 more in the three central provinces, the hundreds of buildings that had been strengthened under the DWF programme withstood the impact. Community leaders and householders have increasingly accepted that investment in prevention is better than risking the high price of reconstruction. Following Typhoon Xangsane, provincial authorities issued an edict that DWF’s ten principles be applied to all houses and public buildings.³² The average cost of strengthening a house is about 25% of its total value.³³ The DWF were again active after Typhoon Damrey, providing advice to improve housing resilience, focusing on the quality of the foundations and roofs.

Working with the Vietnamese government, the UNDP plans to build 300 houses by the end of 2018. The two-room houses are based on vernacular rural houses but designed with a stronger structure, including a mezzanine level to protect against flooding, reinforced roofing and the use of strong cement. The housing is part of a US\$29.5m project funded by the UN Green Climate Fund aimed at increasing resilience in Vietnamese coastal communities to the effects of climate change.³⁴ Further, Japan has been providing Overseas Development Aid to Vietnam since 1992 and more recently the Japan International Cooperation Agency (JICA) has been working with the Vietnamese Government on a comprehensive climate change cooperation strategy aimed at promoting low-carbon and climate-resilient urban development and enhancing climate risk management from typhoons and flooding, especially in the Mekong delta.³⁵

32 DWF 2018
33 Lewis 2010
34 Taylor 2018
35 JICA 2016

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The importance of flood mitigation and control has been recognised as fundamental to the continued development and prosperity of Vietnam and in order to minimize the flood damage, the Vietnamese Government is considering both structural (e.g. dike construction) and non-structural measures (floodplain management and regulations) including, flood mitigation, disaster-warning systems, emergency preparedness, and disaster management. There is also evidence that Vietnamese society is becoming more economically resilient and better able to finance recovery. The percentage of adults able to raise funds in emergency rose from 67% to 70% between 2014 and 2017, and the proportion relying on family and friends fell from 25 to 14%. The percentage using their own savings to cope with emergencies rose from 2 to 14% and the proportion borrowing from a financial institution rose from 21 to 25%.

Considerations for the Insurance Sector

Insurance, along with building control, financial incentives and tax measures, is recognised as an important instrument in disaster risk reduction.³⁶ Yet insurance played an insignificant role in recovery after Typhoon Damrey. The level of insurance penetration is low, and most families rely on family and friends to rebuild their homes, restock their businesses, and to repay bank loans. This reallocation of resources within communities is effective but limited if many people in the same local area are affected by the disaster, in which case households are unable to fall back on these informal insurance mechanisms.³⁷ Some larger fish farms had business continuity insurance with French insurers, but these were parametric policies, which trigger payments when wind speeds exceed 150 km per hour; this threshold was not reached by Typhoon Damrey. As Vietnam urbanises and average incomes rise, the level of insurance penetration is likely to increase.³⁸ The factors that significantly affect willingness to pay for flood insurance in Vietnam are wealth and household income, education, height of the home above ground, past experience of floods including having to evacuate or being injured, and finally a high discount rate of >50% (i.e. a high level of preference for the present). Perhaps surprisingly, neither government flood management nor the expectation of future floods seems to affect WTP.

Investment risks in Vietnam are generally low³⁹, but the analysis does highlight a couple of areas of concern, namely the State’s dominance in the banking and financial sector, the poor standard of infrastructure. The Government has recognised the second of these issues and is addressing it. Government imposed financial constraints are expected to continue to be severe in Vietnam, especially for private firms and this will distort the size of the capital market.⁴⁰

Section 6: Key Findings

Damrey was the strongest typhoon to strike south-central Vietnam since Typhoon Lingling in 2001. Strong winds, heavy rainfall and severe flooding killed 142 people and caused damage of US\$1.03 billion. Damrey was distinctive for its storm track – the majority of storms track further north over Hainan and Hanoi – but Typhoon Damrey hit the southerly Khánh Hòa province and then continued through Đắk Lắk. More than 3,700 homes collapsed or were washed away, and 118,402 houses were damaged or lost their roofs. Nevertheless, Vietnam’s economic performance in 2017 was strong and GDP growth was nearly 7%.

Vietnam has 3,230 km of coastline and is hit almost every year by typhoons and the people living in coastal areas are relatively aware of and prepared for the risk of flooding. Flooding is limited to an area of 1-3 km from the coastline and people know when and where to evacuate. Government control in Vietnam is comprehensive and far-reaching and there was a fast, coordinated response to the storm. But state aid only covered a fraction of the total construction needs and less than 2% of housing reconstruction needs was met by the state.

Recovery after Typhoon Damrey was remarkably quick and over 90% of displaced families were rehoused within four months and infrastructure, including roads and hydraulic structures were repaired within 12 months. Only the agriculture sector took longer to recover. Remarkably little attempt, however, was made to build back better. Insurance played an insignificant role in recovery after Typhoon Damrey and people rely on loans from family and friends. Community self-help through informal loans from friends and family is likely to diminish as Vietnam urbanises and average incomes increase; some larger agro-fisheries already have business continuity insurance.

There are opportunities for extending private insurance in Vietnam. Vietnam is in a process that began in the late 80s, of moving from state control to a market economy. Industry and tourism are overtaking agriculture as the main economic sectors and agriculture is moving from staple crops to the cash crops of rice to coffee, cashew and fruit. Foreign investment, principally from Japan and Russia to date, is increasing and as the country gets richer people have more to lose.⁴¹ However, banks are state controlled and financial services highly regulated, but there are indications that the government is relaxing its grip. Interest rates on bank loans are high (12-14%) and repayment schedules

US\$1.03b

cost of typhoon damages

7%

Vietnam's GDP growth in 2017, despite the storms



36 McAneney et al. 2015
37 Zylberberg 2010
38 Reynaud et al. 2012
39 JICA 2013
40 Zhou 2018

41 Norton and Guillaume 2007

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