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FINANCING DISASTER RISK REDUCTION FOR SUSTAINABLE DEVELOPMENT IN ASIA AND THE PACIFIC

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INTRODUCTION

World leaders gathered in Sendai, Japan in March 2015 at the Third United Nations World Conference on Disaster Risk Reduction (WCDRR) committed to enhancing their efforts to strengthen disaster risk reduction and to reduce disaster losses of lives and assets worldwide.¹ The Secretary-General of the United Nations Ban Ki-moon has highlighted the critical need for financing for disaster risk reduction (DRR) to ensure sustainable development by stating that “*disaster risk reduction is the best beginning on our journey to the Addis Ababa meeting in July on financing for development*” in his opening remarks at the WCDRR.² The Open Working Group proposal for Sustainable Development Goals (SDGs) also pay attention to building resilience to natural disasters by expanding the emphasis from poverty eradication in the previous Millennium Development Goals (MDGs) to addressing challenges in achieving ‘*sustained and inclusive economic growth, social development, and environmental protection*’.³

Despite progress made in the Asia-Pacific region since the adoption of the Hyogo Framework for Action (HFA) in 2005, overall investments in DRR measures have not been sufficient. Investments in DRR compete with other public financing needs, and have not been a high priority in many countries. The Global Assessment Report (UNISDR, 2015) states that DRR investments, globally, “*represent only 0.1 percent of the US\$ 6 trillion per year that will have to be invested in infrastructure over the next 15 years.*” As such, the Sendai Framework for Disaster Risk Reduction 2015 – 2030 adopted at the Third WCDRR stresses investing in DRR for resilience as one of its four priorities for action.

In light of this priority, the paper discusses how resources are used, and looks at two specific financing tools - parametric insurance and international risk pooling mechanisms - for countries to consider for DRR purposes. Both tools have the potential to significantly reduce disaster risks at multiple levels of society. The first chapter briefly looks at the impacts of natural disasters on sustainable development in Asia and the Pacific as well as the effectiveness of DRR investments. This is followed by an overview of current DRR efforts made by governments and international donors from a financing perspective. The third and fourth chapters give detailed descriptions and analysis of parametric insurance schemes and international risk pooling mechanisms respectively.

Some of key findings include:

- Investments in DRR have been effective in addressing the impacts of natural disasters on development, while these should target the poor and the vulnerable who suffer more from natural disasters.
- Allocations of public financial resources in DRR have been growing in Asia and the Pacific, but the focus of disaster management is still predominantly on post-disaster relief, including in multilateral assistance in the event of disasters.

¹ Sendai declaration. 18 March 2015. Available at http://www.wcdrr.org/uploads/Political_Declaration_WCDRR.pdf.

² Available at: http://www.un.org/apps/news/infocus/sgspeeches/statments_full.asp?statID=2544#.VQo5-U3-J2Y.

³ Open Working Group Proposal for Sustainable Development Goals, available at <https://sustainabledevelopment.un.org/content/documents/1579SDGs%20Proposal.pdf>.

International aid for DRR investments has been still very small, and has concentrated in a few countries and in small number of projects.

- Insurance has been promoted in the region, but penetration of traditional indemnity-based insurance was very low in the region. Recent development of parametric insurance provides new opportunities to address disaster risks that agricultural sector faces in particular. (Chapter 3)
- Regional risk pooling mechanisms for DRR can contribute to reduce disaster risk especially in small countries where domestic financial markets are not big enough to develop and employ various financing mechanisms for DRR. (Chapter 4)

1. IMPACTS OF NATURAL DISASTERS AND INVESTMENTS IN DRR

1.1. Natural Disasters threatens development

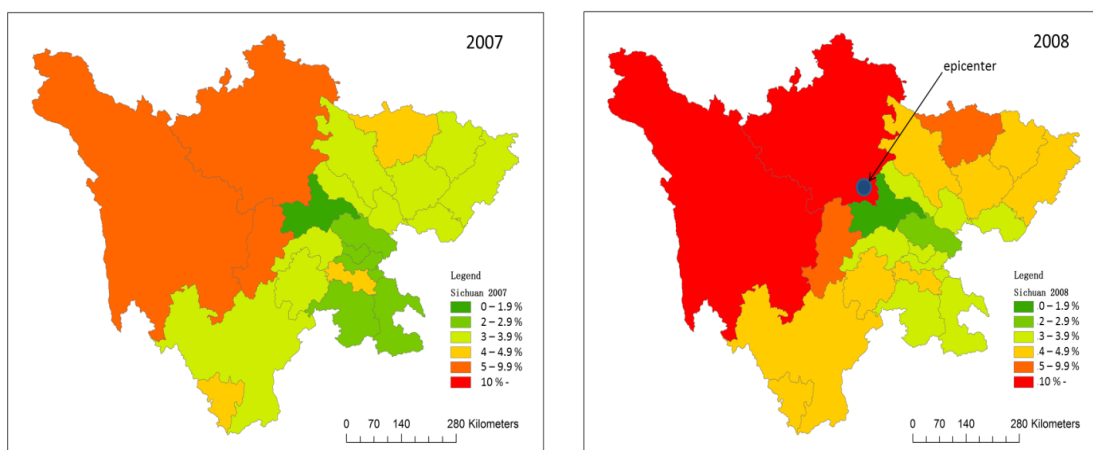
Asia and the Pacific is the most disaster-prone region in the world. Looking at direct impacts, damage from natural disasters totaled US\$ 1.15 trillion (in constant 2005 US dollars) in Asia and the Pacific since 1970, accounting for around 41 percent of the global figure (ESCAP, 2015a).⁴ Moreover, economic losses as a percentage of GDP have risen faster in this region than at the global level. During this period, around 2 million lives were lost, and more than 6 billion people suffered from natural disasters (ibid.). In 2014, natural disasters continued. Close to 80 million people were affected and the overall economic losses reached US\$ 60 billion (in current US dollars) (ESCAP, 2015b).

Indirect impacts are more difficult to observe and quantify, but many studies showed that natural disasters have negative impacts on long term economic development.⁵ Although a few cases have showed that it may be possible for natural disasters to result in positive long-term output growth mainly due to capital replacement and fiscal stimulus effects (Albala-Bertrand, 1993; and Skidmore and Toya, 2002), many others have recorded overall negative long-term impacts on GDP levels (ESCAP, 2013; Kousky, 2014; and Noy, 2009). After the Sichuan Earthquake in 2008, there was a sharp increase in the number of vulnerable people receiving ‘basic provision protection’ in both urban and rural areas, and the impacts have persisted up until today. Before the disaster, the share of the population that was participating in the ‘basic provision protection’ scheme was below 40,000 per million people. However, when the earthquake hit the region there was a sudden increase in the number of people receiving assistance under the scheme to around 60,000 per million in 2008, and there has been no sign of returning to the pre-disaster level (figure 1.2). Likewise, in Japan, the Kobe Earthquake in 1995 reduced the GDP level of the affected region by more than 10 percent, and it has not yet fully recovered many years after the disaster (DuPont and Noy, 2012). In Viet Nam, Noy and Vu (2010) also found, using econometric methods, negative long-term impacts of natural disasters in different provinces.

⁴ “Direct” impacts refer to the immediate consequences of a disaster as defined by Rose (2004).

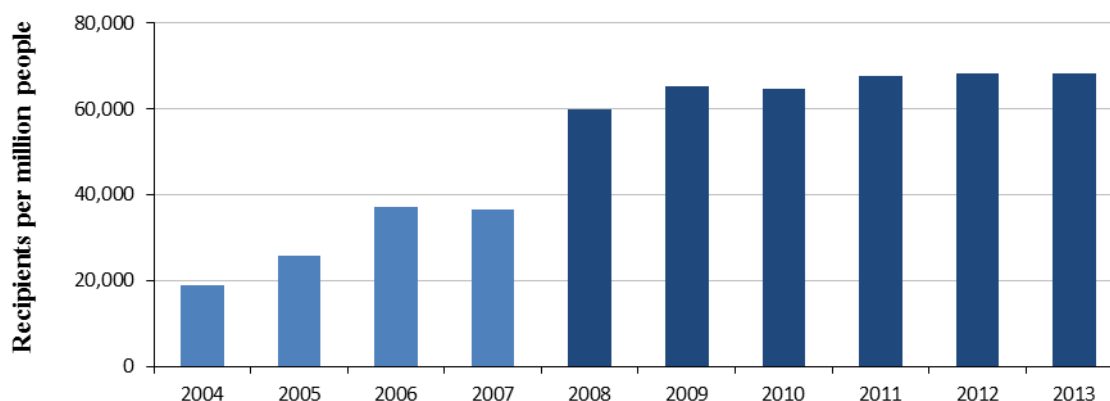
⁵ “Indirect” impacts refer to losses that are not directly triggered by a disaster itself as defined by Rose (2004).

Figure 1.1 Percentage of people receiving 'Basic Provision Protection' in 2007 and 2008 in Sichuan, China



Source: Sichuan Statistical Yearbook (2007 & 2008)

Figure 1.2 Recipients of 'Basic Provision Protection' support in Sichuan, China (2004 - 2013)



Source: Sichuan Statistical Yearbook (2005 - 2014)

1.2. Investments in DRR - cost effective

In face of considerable development challenges from natural disasters, DRR is no longer an option but a must. Investments in DRR measures are not only effective in saving lives from natural disasters, they are also cost effective. The World Bank (2008) reported that the benefits of improved hydro-meteorological information systems outweigh their costs in Asian and European countries. In China, it was reported that the benefit-cost ratio of investments in EWS can be as high as 35. Between 1960 and 2000, China's spending of US\$ 3.15 billion on flood control averted potential losses of more than US\$ 12 billion (in current US\$) (World Bank, 2004). In India, disaster mitigation and preparedness measures in the province of Andhra Pradesh have yielded a benefit-cost ratio of 13.3 (Venton and Venton, 2004). In Viet Nam, a mangrove-planting project, which aimed at protecting the coastal population from typhoons and storms, had an estimated benefit-cost ratio of 52 over the period 1994 – 2001 (ERM, 2006).

Kelman and Shreve (2013) compiled different quantitative studies on the cost effectiveness of DRR for individual countries, and Table 1.1 is a summary of findings for countries in Asia and the Pacific. Although not all of DRR investments recorded

larger returns than costs, benefits of DRR investments exceeded the costs in most cases.

Table 1.1. Cost effectiveness of DRR investments in Selected Cases

Location	Disaster Type	Benefit / Cost ratio
Australia	All	3
Bangladesh	Cyclones, Flood	1.18-3.04
China	All	35 to 40
Fiji	Flood	3.7 to 7.3
India - Rohini River Basin	Flood	2-2.5
Indonesia	Flood	2.5
Islamic Republic of Iran - Dez and Karun catchments	Flood	0.29-1.03 (levees); 0.78-1.34 (dams)
Maldives	Flood, tsunami, heavy rainfall, swell waves	0.28-3.65
Nepal	Drought	Expected average of 9
Pakistan - Lai River	Flood	1.3 to 25.0
Philippines	Volcano	> 9
Viet Nam	Cyclone	> 4

Source: Kelmam and Shreve (2013).

1.3. DRR investments targeting the poor and the vulnerable population

Natural disasters are likely to have more severe impacts on the poor and the vulnerable population, and thus investments in DRR need to be targeted to address the resilience of the poor and the most vulnerable. Those who are socially and economically marginalized often face greater threats, and in Asia and the Pacific, a significant proportion of the population is still living below poverty standards. Approximately 40 percent of the regional population is living on less than US\$ 2 a day (2005 PPP), and 18 percent or 772 million people are living on less than US\$ 1.25 a day in 2011 (ESCAP, 2014). They have little disposable financial resources to mitigate disaster impacts, and often do not have access to affordable healthcare.

In Bangladesh, the poorest households suffer the most during ‘monga’, a period of distress that tends to follow droughts or floods. Research has shown that the proportion of both food poverty and extreme poverty increase significantly during this period.⁶ While some of the wealthier households manage to cope with monga through various adjustment mechanisms, the ‘extreme poor’ are the ones who have a higher chance of experiencing starvation for extended periods of time, leading to severe malnutrition.⁷

In the Philippines, Super Typhoon Haiyan (also called “Yolanda”) in 2013 hit the poor

⁶ Monga refers to a state of economic distress that follows the regular droughts or floods in Bangladesh, defined by Sen (1981).

⁷ “The extreme poor” refers to the households whose combined food and non-food spending do not allow them to reach the “food poverty line” defined by Khandker, Khalily and Samad (2010).

and the vulnerable more severely. Compared to the rest of the population, low-income households suffered from larger cumulative losses, and their income and consumption also recovered more slowly (Anttila-Huges and Hsiang, 2013). Moreover, it has been found that in the Philippines, the female population had much higher fatality rates compared to their male counterparts in catastrophic disasters. In particular, death rates during the year after typhoon exposure were significantly higher for female infants compared to the rest of population.

The Great East Japan Earthquake in 2011 also led to much greater impacts for the vulnerable population. For example, the death rate of the disabled population in the year of the earthquake was double that of the general population. In the coastal areas of Miyagi, the death rate of the disabled was 3.5 percent, 4 times higher than that of the general population (Fujii, 2012).

These country examples suggest that governments and their partners need to make a special effort to incorporate considerations regarding the poor and the vulnerable groups such as the disabled into their strategies for DRR, and to back these up with adequate financing.

2. BUDGETARY ALLOCATIONS SCHEMES FOR DRR

2.1. Government budgetary allocations for DRR

Allocations of public financial resources in DRR have been growing in many countries in Asia and the Pacific, and many countries have included DRR guidelines into their policies and regulatory frameworks. However, the focus of disaster management is still predominantly on post-disaster relief, and most schemes dedicated to financing for disaster management focus on the availability of resources in case of disaster events, rather than strengthening resilience to natural disasters. While disaster response and relief is no doubt essential, the public sector should also consider the high potential returns of investing in DRR, as demonstrated in the above.

In Nepal, district governments are required to maintain a fixed deposit for post-disaster response purposes, and village level administrative bodies have been advised to maintain funds for emergencies (Fuente, 2012). Post disaster expenditures generally exceed pre-disaster expenditures, although expenditures on pre-disaster mechanisms have steadily increased. In Mongolia, in 2013, around 1 percent of the total government budget is allocated to disaster management.⁸ In the Cook Islands, while *the Emergency Management Cook Islands (EMCI)* deals with expenditures for both ex-ante and ex-post disaster management, more focus has been given to relief and recovery.

Although post-disaster recovery tends to be prioritized over DRR, in recent years some countries have made significant progress in ex-ante risk reduction measures. In Indonesia, financing for DRR has been supported by the development of national

⁸ From a presentation made by the government of Mongolia: “Disaster risk reduction and climate change adaptation in Mongolia”, in 17th February, 2015.

strategies, policies, institutions and legislations. Total investments on DRR have also significantly increased over the past several years from around IDR 2.6 trillion (US\$ 287 million) in 2006 to almost IDR 10 trillion (US\$ 1.1 billion) in 2012, reaching 0.7 percent of the total government budget (table 2.1). For provincial governments, the average DRR spending was around 0.6 percent, and this spending was mostly for capacity building and training, campaigns, consultations and regulatory administration. Nationally, the majority of DRR spending of Indonesia was devoted to mitigation and prevention, which averaged around 76 percent of total DRR spending between 2006 and 2012.

Table 2.1. Budgetary allocations for DRR in Indonesia, 2006 – 2012

	2006	2007	2008	2009	2010	2011	2012
Budget for DRR, billion IDR	2,548	3,588	4,386	3,807	5,158	8,977	9,876
DRR Budget, as a % of GDP	0.08%	0.09%	0.09%	0.07%	0.08%	0.12%	0.12%
DRR Budget, as a % of National Budget	0.38%	0.47%	0.44%	0.41%	0.49%	0.68%	0.69%

Source: Darwanto (2012).

Table 2.2: Spending on DRR in Indonesia by Type of Programme

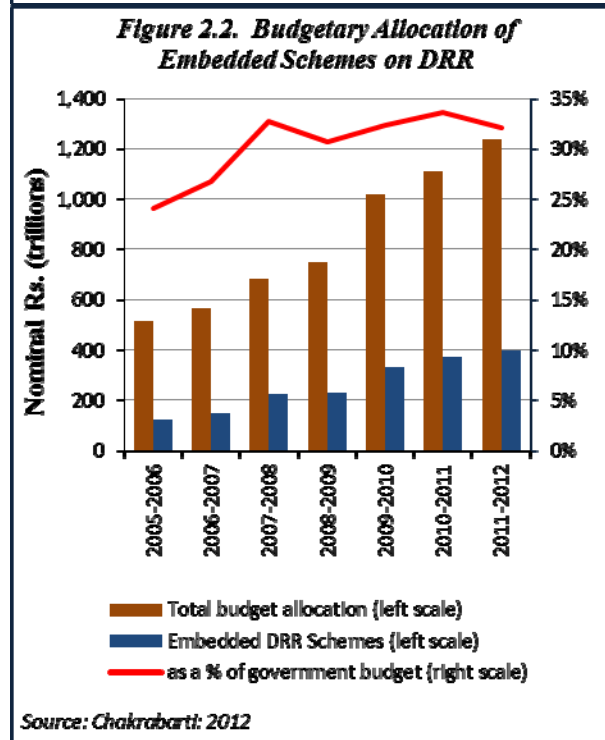
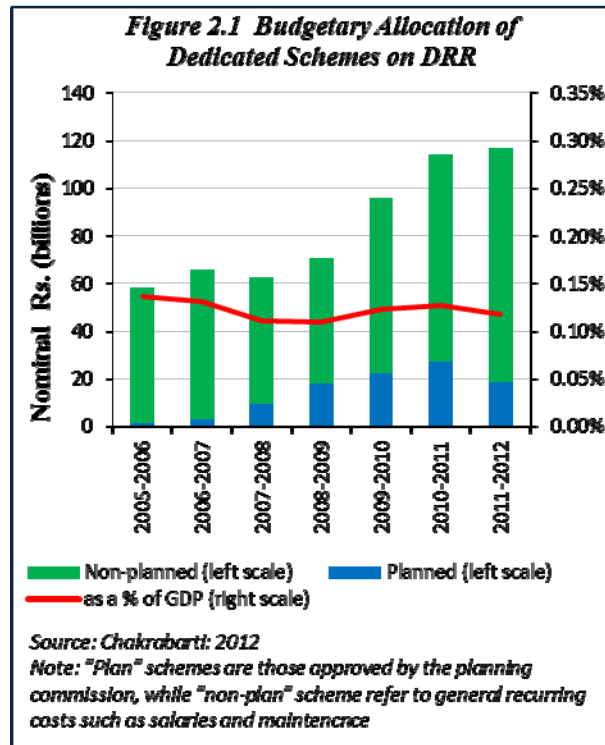
Activity	Average (2006-2012)	2012
Disaster Mitigation and Prevention	76.15%	79.90%
Preparedness	12.7%	14.95%
Research, education and training	5.86%	0.75%
Early Warning System	3.32%	2.24%
Laws and Regulations Strengthening as well as Institutional Capacity Building	0.78%	1.23%
Improvements of Community Participation and Capacity for DRR	0.73%	0.18%
Disaster Management Planning	0.46%	0.74%

Source: Darwanto (2012).

While government budget allocations dedicated for DRR are significant, it should be noted that in many cases, DRR components are ‘*embedded schemes*’ scattered across different government budgetary allocations, such as more disaster-resilient building standards or improved disaster information transfer through communication networks (Chakrabarti, 2012). In India, in the 2011-2012 fiscal year, 85 such ‘*embedded schemes*’ were found in 33 ministries or departments. Some of these were spent on reducing ex-ante disaster risk, but since they were parts of different fiscal schemes across different sectors, it is difficult to isolate their DRR components. Overall, the share of the government budget in which DRR components are embedded increased from around 24 percent of total government budget in 2005-2006 to around 32 percent in 2011-2012 (figure 2.2).

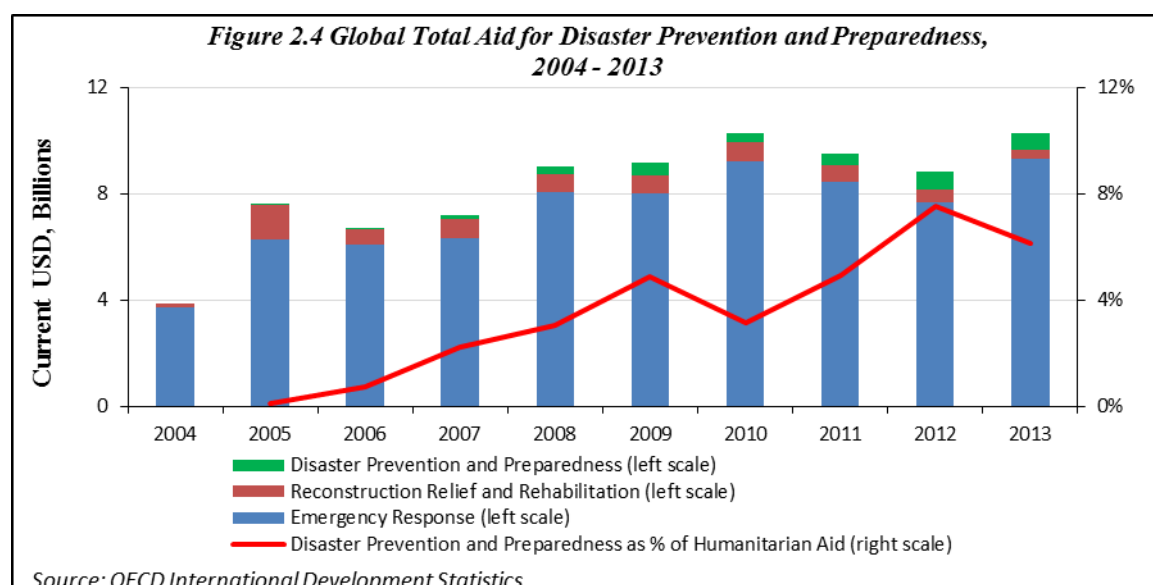
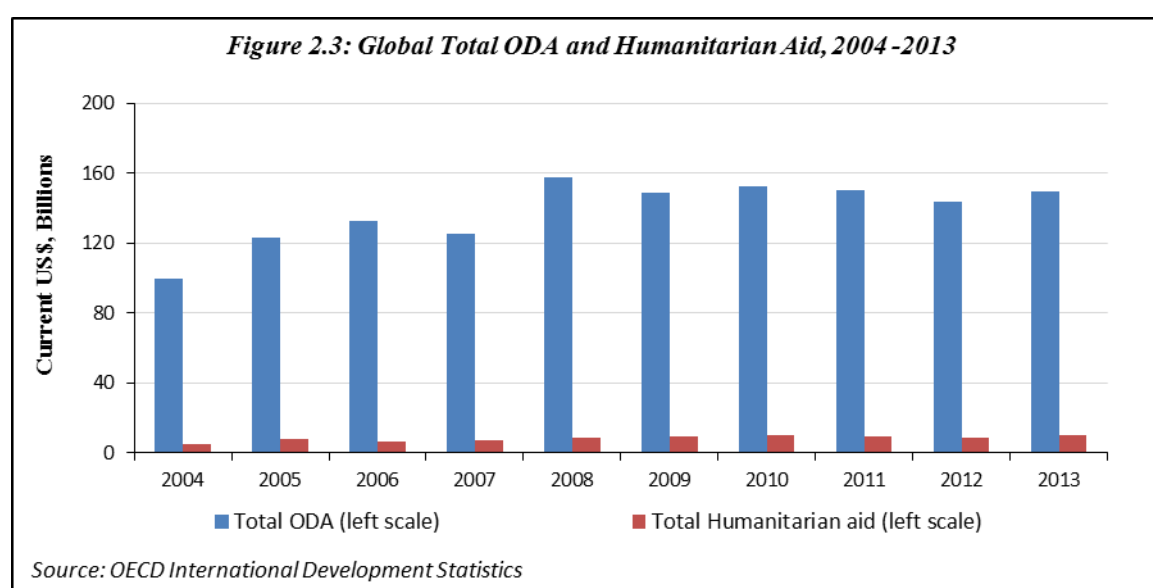
In India, compared to the government budget dedicated for DRR, *embedded schemes*

tend to be more focused on ex-ante measures such as ensuring that there are resources available for disaster response and relief. In the fiscal year 2011-2012, the twin flagship schemes ‘State Disaster Response Fund’ and ‘Disaster Response Fund’ accounted for more than 80 percent of the total budgetary allocation. Embedded schemes, on the other hand, include DRR mechanisms such as mitigating risks, capacity building on skills and awareness, early warning systems and risk assessment infrastructure. While they are not specific budget items for DRR, they contribute significantly to reducing the potential impacts of natural disasters.



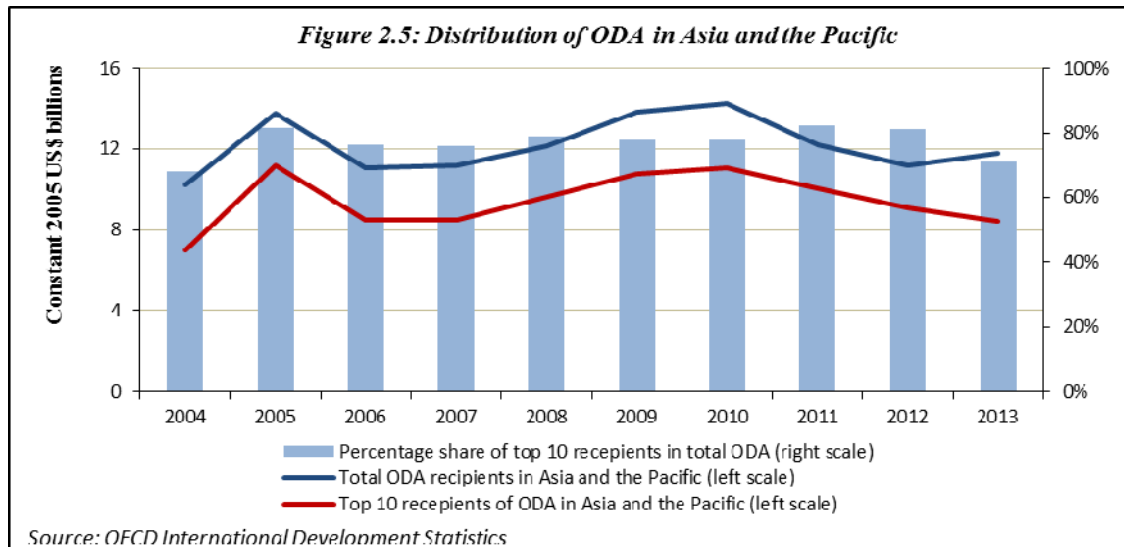
2.2. International Aid for DRR

International aid has provided financial resources for DRR, but DRR has given a very low priority. From 2004 to 2013, the global total annual ODA was between approximately US\$ 100 billion and US\$ 158 billion (in current US dollars), while the total global humanitarian aid rose from US\$ 5.4 billion and US\$ 10.3 billion (figure 2.3). On average, 86 percent of the global total humanitarian aid was allocated for emergency response, while the share of DRR (disaster prevention and preparedness) have increased but remained under 8 percent (figure 2.4). In real terms, the total amount for DRR increased from US\$ 7.7 million to US\$ 630 million (in current US dollars). ODI and GFDRR (2013) also reported that the share of disaster risk reduction was only 12.7 percent (or US\$ 13.5 billion) in the international funding for natural disasters of US\$106.7 billion between 1991 and 2010. This was substantially lower than the share of emergency response (65.5 percent) and reconstruction and rehabilitation (21.8 percent).



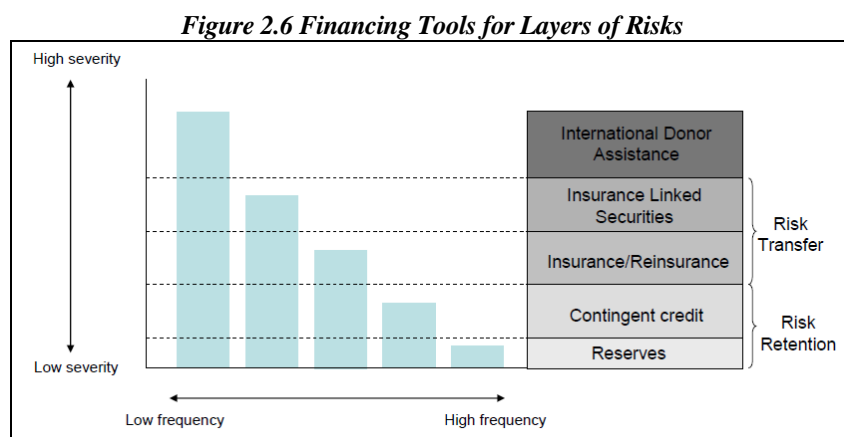
Moreover, the allocation of ODA has been skewed towards a small number of countries in the region. The total ODA received by Asia and the Pacific, in real terms, has

remained roughly stable at an average of US\$ 12 billion. However, the share of funding channeled to the top 10 (out of 41) ODA recipient countries in Asia and the Pacific was around 77 percent (figure 2.5). Kellet and Sparks (2012) further reported that the total amount of international aid for DRR was also heavily skewed towards a few countries. ODI and GFDRR (2013) also found high concentration of financing in relatively few middle-income countries and in a small number of projects, while many high-risk countries sharing little funding spread across many projects.



2.3. Other financing mechanisms for DRR

While government budget and international aid should further address DRR, it is necessary to employ a proper financing mix considering the types and characteristics of natural disasters as well as the capacity to absorb their impacts, as various financing mechanisms for DRR have different strengths in addressing natural disasters depending on their severity and frequency (figure 2.6). Government reserves and contingent credit can be widely adopted for high frequency, low severity disasters such as droughts, but protection from low-frequency, high severity disasters should be sought using access to capital markets. Financial instruments such as CAT bonds and insurance products can also offer protection against disasters in a cost efficient way.



Source: World Bank (2010), Figure 7, p17.

Contingent credit facility, an ex-ante agreement that guarantees credit for disaster recovery and reconstruction, can be a part of contingency planning that supports timely and efficient financial response to natural disasters. This makes it easier to manage and coordinate mobilization and allocation of resources in the aftermath of a disaster. Such mechanisms are found for example among ASEAN countries such as Lao PDR, the Philippines and Viet Nam. Another tool is (multi-year) reserves, which are useful in covering frequent but small-scale natural disasters.⁹ Marshall Islands has adopted this mechanism, whereby each year the government sets aside a dedicated budget to be utilized only in the case of an emergency from natural disasters. The amount is also matched by a grant contribution by the United States.

Insurance and catastrophe bond (CAT bond) also are important financing mechanism for transferring disaster risk. While it was reported that Asia and the Pacific has not sufficiently utilized risk transfer instruments for DRR (World Bank, 2011), these have good potential for addressing low frequency, high severity disaster risk in particular. CAT bonds are part of a broader class of assets known as event-linked bonds, which make payments on the occurrence of specific events. Bonds are generally issued by insurance companies through investment banks, and they are meant to raise financial resources in times of disasters. In Asia and the Pacific, there has been growing interest in the development of CAT bonds, which are currently utilized (though not widely) in nations with well-developed financial markets such as Japan, Australia and Turkey (Cummins, 2008; Johnson, 2013). The Asia Development Bank (ADB) highlighted that CAT bonds can significantly increase capital market strength in the region (ADB, 2014). It is likely that the region will see further development and wider utilization of CAT bonds and other financial instruments in the future. Insurance can also be an effective risk transfer mechanism, and this will be further discussed in Section 3.

Financial instruments such as insurance and securities are under-developed in many countries in the region, and in the event of a high severity disaster, countries often rely on international donor assistance to alleviate losses. However if a sound financial system is developed for the transaction of CAT-linked securities and insurance and reinsurance schemes, much of the cost in disaster response and recovery could be funded by the countries themselves using these tools.

3. TRADITIONAL AND PARAMETRIC INSURANCE

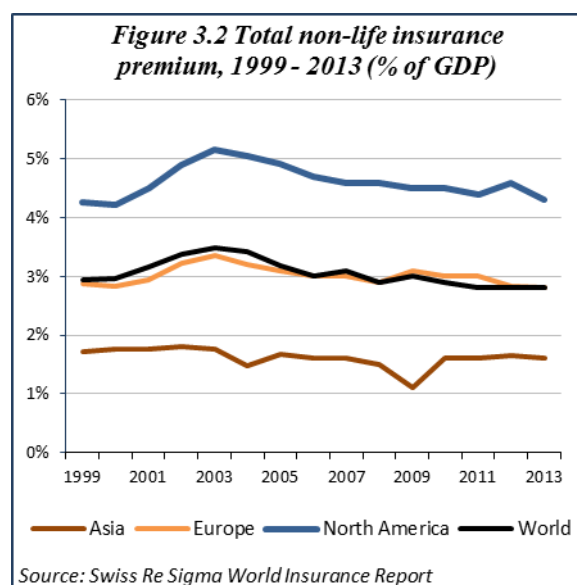
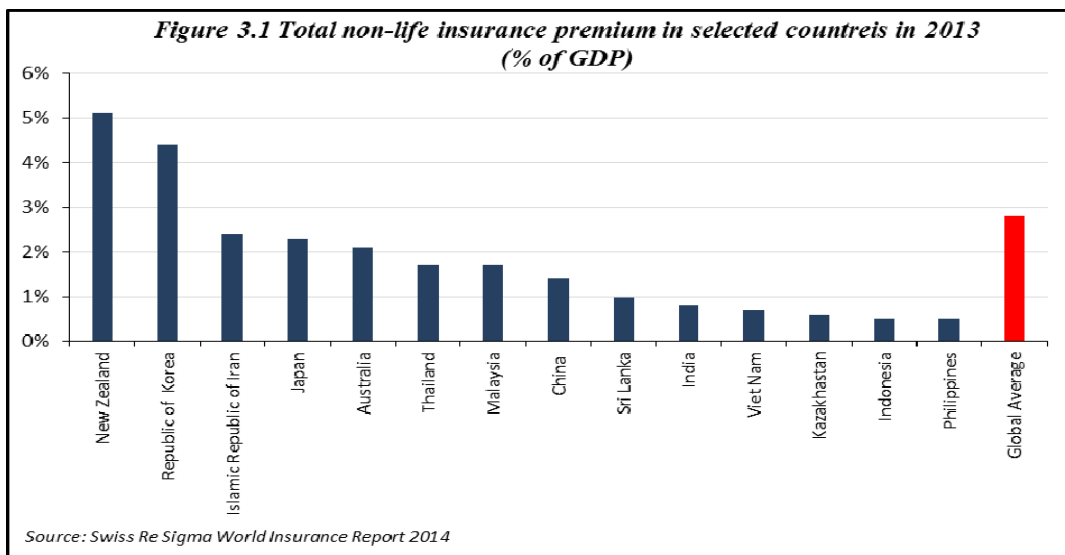
3.1. Low Penetration of Traditional Insurance for DRR

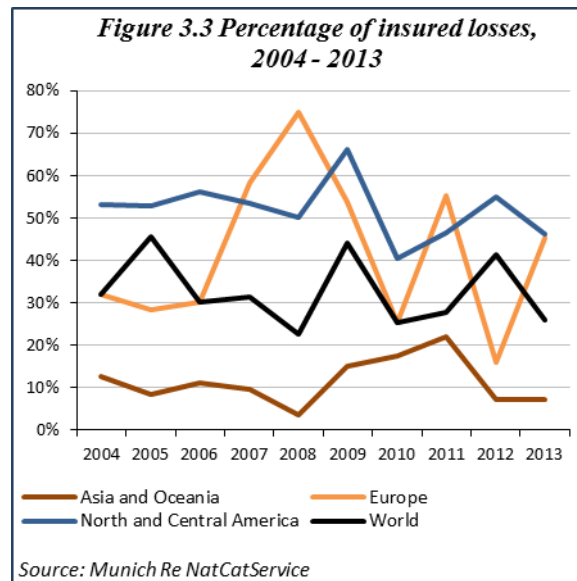
Insurance is one of the risk transfer tools that have good potential for building resilience in disaster-prone Asia and the Pacific. In order to promote insurance to natural disasters, several governments in the region are involved in developing and/or providing insurance products and supporting these with subsidies. In Japan, earthquake insurance that covers damage or losses caused by earthquake, volcanic eruptions and tsunamis is supported by the government through a reinsurance scheme provided by the Japan Earthquake Reinsurance Co. Ltd (JER). In New Zealand, the government-provided Earthquake

⁹ UN (2015) Global Assessment Report refers to this as ‘extensive risks’ (minor but recurrent disaster risks).

Commission (EQC) scheme is available alongside private earthquake insurance. In Thailand, after the 2011 flooding, the government established a National Catastrophe Insurance Fund (NCIF) to make disaster insurance and coverage broadly available to both businesses and households. In only a few Asia-Pacific economies such as Hong Kong, Malaysia and Singapore is disaster insurance mainly provided privately (OECD, 2013).

Disaster insurance, however, has met with limited success over the last a few decades. Penetration rates are low in the region, and the insurance markets for natural disasters and more generally for non-life insurance are also limited. Total non-life insurance premiums, as percentage of GDP, were generally lower than the world average in 2013, except in New Zealand and Republic of Korea (figure 3.1). Between 1999 and 2013, the figure was hovering between 1 and 2 percent in Asia, compared to North America and Europe whose total non-life insurance premium moved around 4.5 percent and 3 percent respectively (figure 3.2). A similar result was found when the percentage of insured losses was considered (figure 3.3).





There can be several reasons for low penetration rates. On the *supply side*, in many developing countries in Asia and the Pacific, disaster insurance products are underdeveloped, with insurers often unwilling to cover natural disasters. In the ASEAN countries, it is estimated that less than 10 percent of property damage insurance covers catastrophic natural disasters, while flood, one of the most frequent and costly natural disasters, was the least covered peril (GFDRR, 2012). Moreover, high operational costs and late payouts make insurance schemes less popular. Traditional insurance schemes require individual assessment of damage and losses to determine the amount of payouts, and this imposes significant operation and maintenance costs. Also, assessment of damage and losses after natural disasters delays compensation for the insuree, and this can have negative consequences on the overall effectiveness of insurance schemes, especially when urgent response and recovery is needed.

On the *demand side*, low income communities often find insurance against natural disasters unappealing and thus the low uptake of related products. For poor households, purchasing insurance for future protection from potential natural disasters is often viewed as a luxury considering their lack of financial resources to even meet their current needs. While insurance products are also competing with other disaster financing mechanisms such as post-disaster compensation and contingent credit facilities, people living in disaster prone areas expect public support such as financial aid after major disasters and are thus less willing to purchase insurance schemes. Moreover, in many countries, there is a general distrust in the insurance sector mainly due to mismanagement and uncertain claims in early years of development (OECD, 2012). In India, despite people having sufficient savings and income for investment purposes, they are generally reluctant to invest in the financial sector because the institutional infrastructure is not strong and there is high risk of frauds.¹⁰ In China, people in the rural areas are often reluctant to put their money with local insurance providers in fear of fraud. Adverse selection and moral hazard caused by information asymmetries between insurers and insurees are other challenges.^{11&12}

¹⁰ <http://www.livemint.com/Money/raRRsZ10b2wDDoHUJwNgrJ/60000-crore-loss-from-life-insurance-in-just-two-years.html>.

¹¹ Adverse selection refers the situation where it is more likely for people who suffer more from the insured event to be willing to buy insurance (Polborn, 2006).

Table 3.1. Advantages and limitations of traditional insurance

Advantages	Limitations
<ul style="list-style-type: none">• Protection against natural disaster through transfer of disaster risk by pooling risks	<ul style="list-style-type: none">• Under-developed insurance products• Costly damage assessment and high risk premiums• Late payouts• Lack of institutional and technical capacity• Mistrust / adverse selection / moral hazard• Lack of reinsurance availability

3.2. Parametric Insurance for DRR: Weather Index Insurance

Recent developments in using parametric insurance provide good opportunities for promoting disaster insurance in Asia and the Pacific. Parametric insurance refers to insurance that responds to objective parameters (such as rainfall or temperature) at defined measurement institutions over an agreed period of time. All policy holders of the same contract within the defined area will receive the same amount of payment if the index exceeds certain levels of pre-determined threshold. Accordingly, parametric insurance, and weather index insurance (WII) in particular, can be best adopted when there are strong correlations between the weather index and damage and losses.

3.2.1. Advantages of Parametric Insurance

Compared to traditional insurance schemes, parametric insurance has important advantages. First, it is more transparent and thus it is possible to largely avoid disputes over payouts that often hinder the development of the insurance market. Under this scheme, payouts are triggered and calculated based on the agreed threshold levels of an objective index rather than assessed damage and losses by insurance providers. Moreover, parametric insurance usually allows policyholders direct access to information on when the payouts are made and how they are calculated. Accordingly, in countries where there is low level of trust in the insurance industry, parametric insurance can provide good opportunities in promoting disaster insurance.

Second, since there is no need for on-site assessments for insurance payouts, risk premiums can be significantly lowered and payouts can be made fast. Individual damage and losses assessments are usually costly procedures, and this often contributes to the high risk premiums of disaster insurance. Thus, use of parametric insurance can lower risk premiums. Also, payouts can be made immediately after disaster events by avoiding time-consuming assessment procedures, and this can improve the effectiveness of insurance as a risk transferring mechanism.

¹² Moral hazard refers to phenomenon that the insured person will change his/her behaviour once he acquired insurance (Ahsan, 1982).

Moreover, index insurance can reduce moral hazard that occurs when there are incentives for the insured parties to change his/her behaviour after they purchased insurance. For traditional insurance, this can be a serious issue since the cost to insurees in engaging in risky behaviour is low. However, for parametric insurance, since insurance payouts depend solely on an external factor, there is less incentive for an individual to behave more recklessly knowing that this does not change the likelihood and amount of him/her receiving claims.

3.2.2. Limitations of Parametric Insurance

Despite its potential benefits, there are a few limitations of parametric insurance to consider. First, payouts are estimated based on the index, and can differ from actual damage and losses. This ‘basis risk’ is one of the key constraints of parametric insurance (WFP and IFAD, 2012; Jensen, Barrett and Mude, 2014), and it can result in damage and losses being not adequately covered or over-compensated. Due to the difficulty in finding an index highly correlated with actual damage and losses, and thus minimizing the ‘basis risk’, parametric insurance normally covers only a few types of natural hazards. This limits the scope in which it operates.

Parametric insurance also requires additional technical capacity in designing insurance products and collecting/analysing data. It needs frequent adjustments to capture the damage and losses accurately and to incorporate the changing environment which requires high technical capabilities that many small and medium sized insurance companies in developing countries do not have. Daily/hourly data is also necessary to monitor relevant parameters and to determine payouts. Thus, it may need good support from weather stations in case of WII, although weather data generated from satellite can be applicable.

Box 1. Decomposition of basis risk

Basis risk in parametric insurance, if left unaddressed, could increase, rather than decrease, purchasers’ risk exposure (Jensen, Barrett and Mude, 2014). Moreover, in the agriculture sector, an increase in perceived basis risk leads to a statistically significant drop in demand for index insurance. This is shown in studies carried out in India, where the experience of index insurance is mature. Mobarak and Rosenzweig (2012) used distance from the primary weather station (in this case a rain gauge) as proxy for basis risk, while Gine, Townsend and Vickery (2008) use the proportion of the type of crops covered by the index insurance scheme to represent basis risk. Both of their research found a statistically significant negative impacts on farmers’ demand for parametric insurance.

Recent research has identified two main components of basis risk, namely *design error*, which is associated with the imperfect match of the index and the covariate risk; and *idiosyncratic risk*, which refers to the individual differences in disaster loss experiences. Design error can be reduced by improving the quality of the index through better technical know-how, data collection and experience. However, idiosyncratic risk has to do with the intrinsic characteristic of the area covered and cannot be eliminated (Elabed and others, 2013).

Jensen, Mude and Barrett (2014) has shown that while there is significant design error in index insurance products (in its case on index based livestock insurance scheme in Kenya), the

idiosyncratic losses hold a much larger portion of the downside basis risk. The idiosyncratic risk can further be broken down into a number of relevant factors including *geographical patterns, household variations over place and time, access to labor, cash liquidity, access to credit and proportion of income generated from agriculture activities.*

In Asia and the Pacific, the decomposition of basis risk is not extensively researched. Better understanding of basis risk therefore holds good potential for improving the performance of parametric insurance products in the region.

The advantages and limitations of parametric weather insurance are summarized below:

Parametric Weather Index Insurance

Advantages	Challenges
Less moral hazard and adverse selection	Basis Risk (co-orelation between index and loss)
Timely payout	Sustainability of the index
Lower administrative costs	Precise actuarial modeling
Standardized and transparent structure	Education
Availability and negotiability	Market Size
Reinsurance acceptability	Forecast
Versatility	Micro climates

Source: William Dick, World Bank, 2009.

3.2.3. Adopting Parametric Insurance for DRR

For countries in Asia and the Pacific considering the use of parametric insurance, one of the main constraints is the difficulty in ensuring reliable and fast data communications. Developing countries may need to improve the efficiency and reliability of their weather infrastructure to make parametric insurance products work, while satellite-based weather measurement can complement (or replace) weather station data. Satellite information, when interpreted correctly, is not only useful in filling information gaps, but has the added advantage of being relatively temper-proof. Although there are still issues with satellite data such as poor performance over mountainous terrain, developments are fast and this is a promising field.

To fully utilize the benefits of parametric insurance, there is a need to build capacity and awareness of local stakeholders. In India, there is still a general lack of knowledge on how insurance helps smallholder farmers and the way index insurance can transfer disaster risk (Gine, Townsend and Vickery, 2008). On an institutional level, it is important to ensure that the public sector is ready to cooperate with the private sector in providing support in parametric insurance products. It has been argued that parametric insurance works best in a market economy environment (IFAD, 2012). However it

requires significant weather infrastructure and institutional pre-conditions that may be difficult to achieve without public sector support. Private-public partnerships thus hold one of the keys to initiating successful parametric insurance schemes. In China, the 2008 pilot parametric insurance scheme in Anhui province involved cooperation between the Chinese government, local insurance companies and international organizations.

While parametric insurance, especially WII, offers great opportunities for insurance providers, it inherently carries certain amounts of risk for them. Accordingly, it would be necessary, in particular for small and medium sized local insurers, to engage with reinsurance companies to further transfer disaster risk abroad. The engagement of the reinsurance sector for disaster insurance has been limited in the region. To expand parametric insurance, it would therefore be necessary to attract major reinsurers through opening insurance markets and providing financial incentives and regulatory support.

3.3. Country experiences in Asia and the Pacific

Agriculture is one of the sectors for which parametric insurance has the greatest potential. While agriculture is still a very important sector in Asia and the Pacific, accounting for two fifths of the total regional employment and 7 percent of regional GDP in 2012,¹³ it frequently suffers from the impacts of natural disasters such as droughts and floods. In recognition of the potential benefits of parametric insurance in reducing and transferring disaster risks, WII has been tested and adopted in the agriculture sector, where hydro-meteorological parameters (usually rainfall measurements) are closely linked to crop yields. In particular, agriculture intensive countries such as India (since 2002), China (since 2008) and Thailand (since 2008) have been developing pilot schemes to test the feasibility of such insurance products. Results have been promising while some limitations were also experienced.

3.3.1. India

Indemnity-based insurance began in India in 1999 through the National Agricultural Insurance Scheme (NAIS). The scheme met with limited success as only around 15 percent of farmers were covered. Although parametric based insurance was available before, in 2003, the Agriculture Insurance Company of India (AIC) was set up to provide WII products (India Agricultural Finance Corporation: 2011). In 2004, the Weather Based Crop Insurance Scheme (WBCIS) was introduced and has since been the main publicly provided parametric insurance in India.

WBCIS is designed to protect farmers from adverse weather incidences such as deficit rainfall. Over the years since its introduction, WBCIS has had an average premium of 8 percent of amount covered, while actual values depend on the crop type and region insured (Ministry of Agriculture). The WBCIS has also been subsidized with the average subsidy of 63 percent of risk premium, with subsidy levels ranging from 25 to 80 percent depending on the crop (IFAD, 2010). Crop growth simulation models were developed to capture the correlation between yield and weather indices, which defined the feasible triggers and payout rates. The weather index data are generally taken from commercial

¹³ ESCAP Statistical Database.

weather stations.¹⁴

Table 3.2 Comparison of NAIS and WBCIS in India

National Agricultural Insurance Scheme (NAIS)	Weather Based Crop Insurance Scheme (WBCIS)
Operates under “Individual Approach”, where claim assessment is made for every individual insured farmer who has suffered a loss.	Operates on the concept of “Area Approach”. For the purposes of compensation, a ‘Reference Unit Area (RUA)’ shall be deemed to be a homogeneous unit of Insurance.
Practically all risks covered (drought, excess rainfall, flood, hail, pest infestation, etc.)	Parametric weather related risks like rainfall, frost, heat (temperature, humidity etc.) are covered. These weather parameters appear to account for majority of crop losses.
Easy-to-design if historical yield data up to 10 years is available	Technical challenges in designing weather indices and also correlating weather indices with yield losses. Needs up to 25 years’ historical weather data
Basis risk (difference between the average yield of the Area and the yield of individual farmers)	Basis risk with regard to weather could be high for rainfall and moderate for others like frost, heat, humidity etc.
Objectivity and transparency is relatively low	Objectivity and transparency is relatively high
Quality losses are beyond consideration	Quality losses to some extent gets reflected through weather index
High loss assessment costs (crop cutting experiments)	No loss assessment costs
Delays in claims settlement	Faster claims settlement
Government’s financial liabilities are open ended, as it supports the claims subsidy	Government’s financial liabilities could be budgeted up-front and close ended, as it supports the premium subsidy

Source: AIC, India.

WII is provided publicly through WBCIS, but private WII is also available in India. The first private sector WII was launched in 2003, by two main insurance providers ICICI Lombard and IFFCO Tokio General Insurance Company (ITGI). These WII products were sold through rural corporative banks, input suppliers and contract farming companies. A private micro-insurance provider, BASIX has also provided WII for natural disasters with 40 to 50 percent subsidy since 2008. Customers of BASIX are generally smallholder farmers who have limited access or cannot afford regular credit channels.

WII has made significant progress in India, but there still appears to be significant hurdles. A report by the Agricultural Finance Corporation on the effectiveness of WBCIS found that almost 77 percent of respondents were not satisfied with the locations of weather stations, which are directly linked to the accuracies of measurements.

¹⁴ Four major corporations provide weather data in India: India Meteorological Department (IMD); Weather Risk Management Services (WRMS); National Collateral Management Services Limited (NCMSL); and India Space Research Organization (ISRO).

Moreover, the report noted that the lack of weather data and real-time data transfer posed significant challenges to the accuracy and efficiency of the settlement. For many regions in India, daily weather data was not available, and this made it difficult to design models to capture losses accurately. It was estimated that in India an additional 10,000 weather stations would be needed to improve data quality, and this would cost US\$ 5–6 million in installation and additional 25 percent per year in maintenance costs (IFAD, 2010). Moreover, it often took 30-75 days for insurers to receive information from public weather stations (Sinha and Tripathi, 2014), and this delayed payouts and diminished one of the main benefits of parametric insurance.

The reinsurance sector is also underdeveloped. In India, the sector has been limited and reinsurance rates have been generally very high. Currently, reinsurance is only available for premium values over US\$ 1 million (Sinha and Tripathi, 2014). This is an issue particularly for private WII providers such as BASIX, which focuses on micro-insurance products.

Box 2. Weather based crop insurance scheme coverage (WBCIS)

The WBCIS is expanding rapidly in different agro-ecological zones in India. It's important to highlight that indemnities (I) to premium (P) ratio is less than 0.6. In earlier study, I/P for financial performance of crop programme in India was 5.1 (Hazell 2004) that shows cost effectiveness of parametric weather index insurance.

S. No	Year	States	Districts	Farmers Insured (Millions)	Area (Ha.) (Millions)	Sum Insured (US \$ Millions)	Premium (US \$ Millions)	Payouts (US \$ Millions)	Claim Ratio
1.	2007-08	5	34	0.664	1.042	350.31	48.47	21.33	44.02%
2.	2008-09	14	91	0.375	0.482	177.38	16.34	9.89	60.54%
3.	2009-10	14	143	2.362	3.421	994.49	89.51	69.00	77.09%
4.	2010-11	17	205	9.295	13.2	2866.46	258.86	126.98	49.05%
5.	2011-12	17	230	11.607	15.629	4179.99	370.28	234.38	63.30%
	TOTAL			24.303	33.774	8568.63	783.45	461.59	58.92%

Source: Government of India and AIC

Assessment of risk transfer through WBCIS (Premium: US \$ 375 million)

- a) Retention: 20% - 40% (AIC - 30%) AIC – Agricultural Insurance Company
- b) Domestic Reinsurance: 10% - 40% (AIC - 40%)
- c) International Reinsurance: 30% - 70% (AIC – 30%)

Source: Rao (2012); Agriculture Insurance Company of India (AIC).

3.3.2. China

In China, the World Food Programme (WFP), the International Fund for Agricultural Development (IFAD) and the Ministry of Agriculture initiated a joint parametric insurance pilot in 2008. The WII pilot area was in Anhui province, one of the primary grain production regions in China. It covered around 500 households in Yanhu village in Chengfeng, representing 85 hectares of rice with a total insured value of US\$ 56,000 (IFAD: 2010). Guoyuan Agricultural Insurance Company (GAIC), an insurance provider was selected to be the principle insurance provider covering heatwaves (above 35°C) and droughts. The WII contracts were designed to cover potential losses in

agriculture production costs, and the premium was US\$ 2 per 0.07 ha, and the premium rate was 4 percent of the sum insured. 91.7 percent of the premium was subsidized which was the same level as the national Multiple Peril Crop Insurance (MPCI) (Balzer and Hess, 2010). The pilot product was cheaper than MPCI but covered fewer perils. Weather data was provided by the Anhui Meteorological Service, facilitated by the Institute of Environmental and Sustainable Development in Agriculture (IEDA), within the Chinese Academy of Agricultural Sciences (CAAS). In addition, several decades of rain gauge data were available.

The pilot scheme, while successful in introducing WII into the Chinese agricultural sector, was limited by the underdevelopment of weather data infrastructure. It relied on historical burn analysis to complement weather data to provide accurate modelling, but the use of historical data had many limitations and it was necessary to improve the accuracy and frequency of weather data. Further, there was a need to further build the capacity of the insurance industry as most insurers are not prepared to develop parametric insurance products, despite their strong interest in the sector (IFAD: 2010).

In addition, the majority of farmers did not understand or was not aware of the WII products, and there was a general distrust in the insurance sector, which discouraged farmers' willingness to take up insurance (FERDI, 2014). Moreover, while the WII product was designed to cover production costs, agriculture costs in China are generally very low in comparison to farmers' income as many farmers have external income sources. Hence, they generally did not find strong incentives to protect their agriculture assets with additional insurance. Furthermore, the competition from other crop insurance schemes, bank credit guarantees, or expectations of relief programs made farmers unwilling to spend resources in WII.

3.3.3. Thailand

In Thailand, the WII program for rice crops was piloted in 2008 in the Khon Kaen province, North-East Thailand. It aimed to protect farmers against droughts, a common natural disaster in the region. Crop yields were highly correlated to rainfall in North-East Thailand because farmers depended heavily on rainfall and there was a lack of irrigation infrastructure. The region had a relatively high density of weather stations, and 34 weather stations were available covering an area of around 10,000 square km (Sinha, 2004).

The WII was designed by Sompo Japan Nipponkoa Insurance Inc. (Sompo) and it was based on rainfall using historical data of accumulated rainfall from weather stations and in-field surveys conducted by Sompo and the Bank for Agriculture and Agricultural Co-operatives (BAAC). Three different thresholds were set depending on the date and severity of droughts (categorized as early drought, drought, and severe drought), while the payouts occurred in two different periods. If the rainfall in July was below the threshold of an *'early drought'*, the farmer received 10 percent of the loan principle and then the policy contract would be terminated. If the rainfalls in July remained above that threshold, the policy contract would remain active, and when rainfalls in August and September were below the threshold of drought or severe drought, then the payouts were 15 percent and 40 percent respectively.¹⁵

¹⁵ http://www.sjnk.co.th/view_news.asp?id=29.

It is noteworthy that public private partnerships (PPPs) played critical roles in the pilot in Thailand. The Japanese insurance company Sompo designed the product, and the public BAAC provided local information and acted as a distributor. A public institution, Japan Bank for International Cooperation (JBIC), initiated the business relationship between Sompo and BAAC, and the Thai Meteorological Department provided historical rainfall data and set up the necessary weather stations. The National Institute for Agro-Environmental Science (NIAES) of Japan also provided technical support.

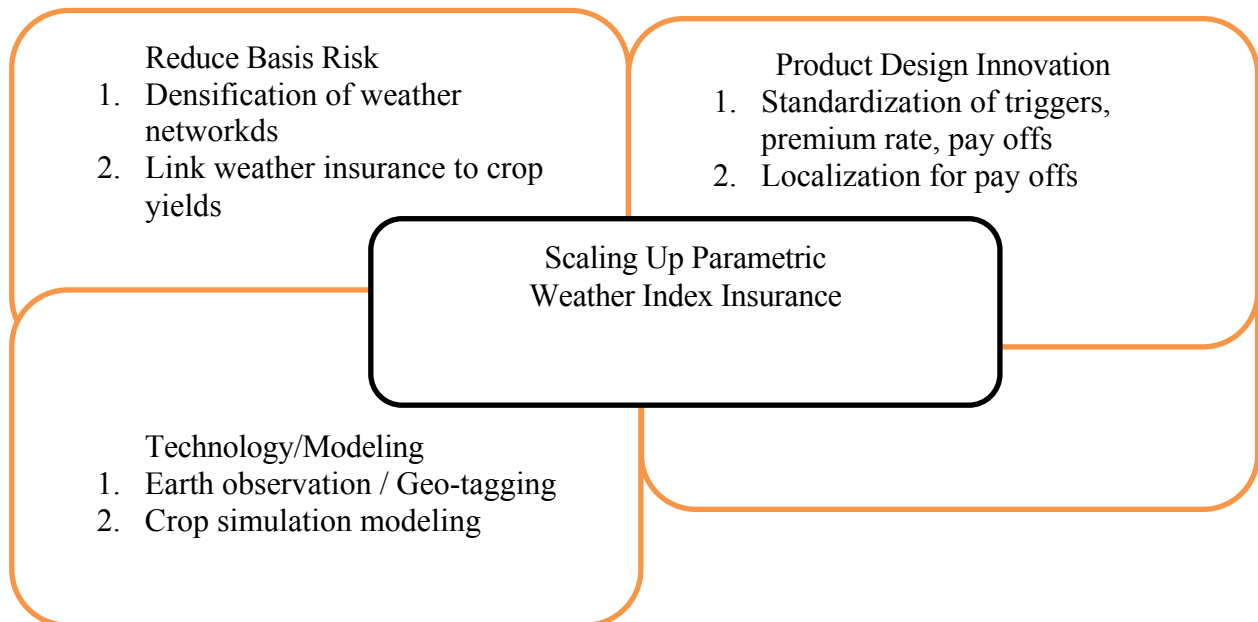
The Thailand WII products have achieved mixed results. While the partnership of Sompo and BAAC and their communication with Thai farmers allowed tailoring of WII products to meet the needs of clients, it suffered from low penetration rates. The lack of awareness and knowledge of WII products can be one of the reasons, as farmers generally considered WII products as additional costs. Nevertheless, the experience was valuable as it helped Thailand apply a relatively innovative DRR tool and fostered cooperation between private and public sectors.

3.4. Scaling up parametric weather index insurance - Way forward

Globally, weather insurance is continuously evolving. While the concept of weather based index has been adopted worldwide, a number of pilot projects in Asia and the Pacific are ongoing using a combination of satellite technology and weather index. China, India, and Thailand are at different phases of adapting WII with varying levels of support from respective governments. Their experiences show that to develop WII as a sustainable DRR tool, there is a need to improve many aspects of insurance design and distribution. Specifically, the following key issues need to be addressed (Sirimanne and others, 2015).

- **Investments in technological innovations** are essential to successful development of parametric insurance. Densification of hydro-meteorological networks in drought-prone areas, development of crop-specific disaster loss databases, and satellite-based insurance products are some examples.
- **Raising the awareness of target clients** is also essential. Potential insurance buyers are sometimes ill-informed about insurance products and do not fully understand the benefits. Introduction of parametric insurance should thus be accompanied by proper marketing and awareness raising campaigns.
- **Minimizing basis risk** is necessary for designing parametric insurance. Increasing the correlation of the index with actual damage and losses will not only allow for a better product, but also improve the confidence of insurees.
- **Risk-layered schemes** are useful in designing parametric insurance. A risk-layer based approach involves multiple insurers taking up different layers of risk coverage for a single WII contract.
- **Developing the reinsurance markets** is also critical in order to encourage the involvement of private insurance companies and to effectively transfer risk from domestic to international insurance markets. This is especially important for poor and vulnerable people, as insurance firms often find them too risky to insure.

- **Targeting institutional level insurance clients** can help expand the scope of the parametric insurance market. Institutions such as cooperatives, banks with outstanding loans and international organizations committed to providing aid in times of crisis have incentives to take up parametric insurance to protect their portfolios.



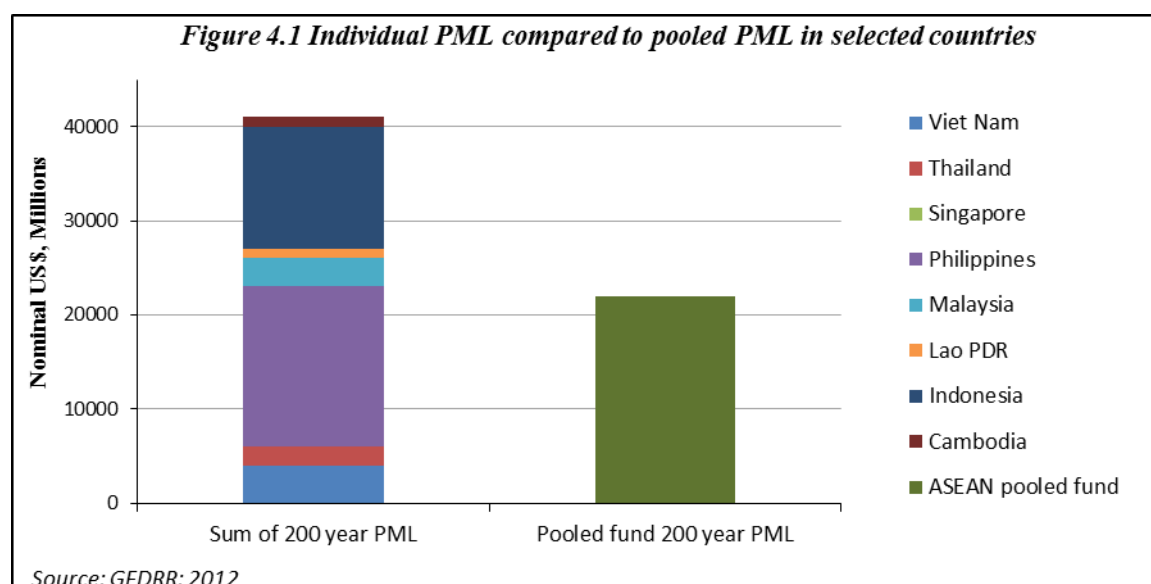
4. INTERNATIONAL RISK POOLING MECHANISMS

4.1 The benefit of Risk Pooling Mechanisms

International risk pooling is another DRR financing mechanism to consider. Risk pooling is not something new, and the London Gold Pool, the Arab Monetary Fund (Middle East), the Latin American Reserve Fund, and, closer in time, the European Stability Mechanism (ESM) are some examples of countries pooling their resources in order to reduce risks. While there are many international and regional risk pooling mechanisms, the first intergovernmental disaster risk pool, the Caribbean Catastrophe Risk Insurance Facility (CCRIF) was created in 2007 (CCRIF, 2010). Other initiatives such as the African Risk Capacity (ARC) and the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) have followed.

The main benefit of risk pooling is better access to international capital and reinsurance markets. Groups of countries are more likely than individual countries to obtain better terms through approaching the capital markets with a larger, more diversified portfolio. This lowers premiums and transaction costs (GFDRR, 2012). Moreover, risk pooling facilitates the transfer of financial and technical knowledge and supports countries to share financial resources, risk management experiences and technical capacities. Risk pooling can also help develop individual countries disaster risk management capabilities.

For Asia and the Pacific, risk pooling can yield significant benefits. Figure 4.1 shows the sum of 200-year probability maximum losses,¹⁶ which is a measure of expected disaster losses in the very long term, for 10 ASEAN member states with and without risk pooling mechanisms. Without risk pooling, the losses add up to more than US\$ 40 billion for these 10 states, while with risk pooling mechanisms the figure is US\$ 21.6 billion, almost half of the original sum. This represents significant savings in the costs of natural disasters (GFDRR, 2012).



4.2. ASEAN Agreement of Disaster Management and Emergency Response

The ASEAN community has been involved in International Cooperation since 1976, when member States pledged mutual assistance in case of a natural disaster. In 2009, *the ASEAN Agreement of Disaster Management and Emergency Response (AADMER)* was established to provide international assistance when disasters strike, and to collaborate in disaster mitigation, prevention, preparedness, response, and recovery and rehabilitation.¹⁷

As stated in the AADMER work programme for 2013-2015, one of its priorities is the development of the *ASEAN Strategy on Disaster Risk Financing and Insurance* that includes the creation of a disaster risk pool. ASEAN member States will first focus on developing technical capabilities regarding risk assessment, data collection, quantification of economic exposure and institutional division of operations. This will be followed by promotion of disaster risk financing tools including insurance and micro-insurance, especially for vulnerable populations and critical sectors of the economy.

Once the initial phases are completed, ASEAN will study the feasibility of a risk pooling entity for member States as well as its expected benefits from economies of scale in

¹⁶ The PML represents the expected loss severity based on likely occurrence, such as the 1-in-100 year loss (event of such severity that the recurrence is anticipated only every 100 years) or the 1-in-200 year loss (GFDRR: 2012).

¹⁷ <http://www.asean.org/archive/documents/19th%20summit/Flood.pdf>.

accessing capital markets and international reinsurance markets. Based on this, a set of recommendations will be made including a concrete implementation plan for the creation of a viable Intergovernmental Disaster Risk Pool by the end of 2019.

4.3. The Pacific Catastrophic Risk Assessment and Financing Initiative

Pacific Island Countries (PICs) have limited government budgets and often require international aid in times of external shocks. In particular, PICs are vulnerable to natural disasters as demonstrated in the case of Tropical Cyclone ‘Pam’, which hit Vanuatu in March 2015. In some cases, damage and losses can reach close to 80 percent of GDP (GFDRR, 2014).

Small island countries have incentives to pool their disaster risk for four main reasons:

1. Limited national financial resources are an obstacle to investing in DRR mechanisms.
2. Risk transfer options are limited due to small size and lack of economic diversification.
3. Significant increases in national debt levels after disaster events are likely due to their small economies.
4. Catastrophe insurance premiums are high due to the countries’ high exposure and vulnerability to natural disasters.

The Pacific Catastrophic Risk Assessment and Financing Initiative (PCRAFI) was formed in 2007 aiming to provide PICs¹⁸ with disaster risk modelling and assessment tools to help them better assess exposure to natural disasters and ultimately provide disaster financing solutions. In January 2013, under the PCRAFI, *the Pacific Disaster Risk Financing and Insurance Program (the Pacific DRFIP)* was launched and joined initially by the Marshall Islands, Samoa, Tonga and Vanuatu. The Cook Islands became the fifth member later. It aims to test the sustainability of market-based catastrophe risk insurance solutions for PICs. The member countries are covered against major tropical cyclones and earthquakes (including tsunamis), and secure rapid injections of liquidity following major natural disaster events. The pilot program focuses on earthquakes and tropical cyclones because these hazards account for 81 percent of the disasters occurrences in PICs and the bulk of economic losses (PCRAFI, 2012).

The World Bank Group provided advisory services in order to support building technical capabilities in risk modelling, product design and post-disaster loss assessment. It also acted as an intermediary between PICs and a group of reinsurance companies that were selected after a competitive bidding process. The PCRAFI is designed to activate the payouts once government emergency response costs reach a trigger level (not actual observed damage), and the payout system is designed to supply immediate liquidity in order for PICs to maintain critical government functions in the aftermath of a major disaster. It is not supposed to compensate for economic losses and does not activate upon less critical events. It is also not designed to replace international aid, which remains a critical factor in post-disaster recovery, but it aims to reduce the PICs’ dependence on it. In 2013, the aggregate coverage amounted to US\$ 45 million (OECD, 2013).

¹⁸ 15 PICs are involved in the programme: Cook Islands, Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Marshall Islands, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, and Vanuatu.

The PCRAFI has developed significant capabilities in data collection and disaster monitoring through *the Pacific Risk Information System (PacRIS)*, one of the most comprehensive collections of geospatial data for PICs (PCRAFI, 2014).¹⁹ PacRis includes country specific data related to assets, population, hazards and risks, such as information from field visits, satellite imagery, and data on building structures (residential, commercial and industrial), agriculture and demography. It also incorporates the most developed historical disaster archives for the Pacific region. The country risk profiles developed for each PICs using those data and the linked probabilistic model are used to develop the disaster insurance products by the PCRAFI.

The first payment of the pilot program was done on in January 2014 when Tonga suffered from Tropical Cyclone ‘Ian’ (a category 5 cyclone). Only 15 days after the event, Tonga received US\$ 1.27 million. This sum is more than the national Tonga contingency budget and more than half of the current reserves of the Tonga National Reserve Fund (World Bank, 2014).

The Pacific DRFIP had success with high-level government involvement, specifically from the finance ministries and national disaster management offices. The active involvement of the World Bank and the other partners has also contributed to increasing institutional capacity for DRR in PICs. Moreover, the DRFIP accessed the international reinsurance market at a very competitive price. According to World Bank’s (2014) estimations, the placement of the disaster insurance policies of PICs through a pooled portfolio resulted in 50 percent cost reduction, compared to the prices that would have been obtained if the PICs had gone to reinsurance market individually.

Outside the Asia and the Pacific region, independent intergovernmental disaster risk pool mechanisms such as the CCRIF can shed light on the direction the Pacific DRFIP in which is heading. This institutional agreement requires not only regional and country cooperation, but also support from international organizations.

Box 2. Experience of risk pooling in the Caribbean

The CCRIF is an intergovernmental risk pool which was created in 2007 in order to provide the small Caribbean countries with affordable catastrophe insurance (of parametric type). It keeps a fraction of its funding capital as reserves, while the remaining part is transferred to the reinsurance and capital markets. CCRIF made 8 payouts between 2007 and 2014, which totaled US\$ 32 million.

CCRIF was able to provide affordable insurance to its members. It issued parametric insurance policies, which use defined parameters such as wind speed, storm surge (for tropical cyclones), earthquake indicators or rainfall to model losses.

In 2007 and 2012, the World Bank (2012) studied whether sovereign disaster insurance purchased through the CCRIF was cheaper than (i) individual countries purchasing comparable insurance policies on their own and (ii) countries self-retained the resources (such as reserves). According to this study, insurance policies offered by the CCRIF outperformed both individual market-based options and self-retention schemes as presented in the following table.

¹⁹ For more information, please refer to: <http://pcrafi.sopac.org/>.

<i>CCRIF savings in comparison to other means in 2007 and in 2012</i>		
Comparisons	2007 appraisal estimation	2012 estimation
Hurricane		
CCRIF savings vs Market	48-56%	54-59%
CCRIF savings vs Self-retention	65-71%	57-75%
Earthquakes		
CCRIF savings vs Market	42-47%	54-62%
CCRIF savings vs Self-retention	49-53%	58-85%

Source: Appraisal stage estimates from World Bank (2007). Achieved estimates by World Bank Disaster Risk Financing and Insurance Program, with data from CCRIF (2012).

4.4. Developing risk pooling mechanisms

Intergovernmental disaster risk pooling mechanisms, in which small island countries or developing countries participate, can be efficient in providing financing for relief to poor and vulnerable populations after a disaster. Provided that the funds are well managed, payouts can be available quickly and the government can use them in a timely manner to prevent extreme economic and human consequences. Such an agreement can work especially well in strengthening the resilience of a group of small countries with high disaster exposure. The World Bank (2012) monitored the use of funds granted to the CCRIF and subsequently to the policy holder nations in the aftermath of disasters that triggered payouts. The report found that the funds had been used in operations targeting vulnerable populations allowing critical government functionalities to run.

While there are positive impacts of risk pooling mechanisms, Asia and the Pacific is still at an early stage of development, and countries further need to increase knowledge on what can expect from the international risk pooling agreements. The Pacific DRFIP, for example, suffered a setback in 2014 when the Solomon Islands decided to withdraw from the facility as the country suffered two disaster events that did not trigger payouts. This suggests that some of the terms listed in the agreement may not be satisfactory for all member countries. There is a need to review the terms of the pooling agreements, including trigger levels and payment amounts. On the flip side, member countries need to understand the long-term benefits and costs on a risk pooling mechanism.

The current risk pooling mechanisms in Asia and the Pacific can learn from experiences from outside the region, such as the CCRIF. The CCRIF owes its success, to a large extent, to the cooperation of financial institutions across many countries including Japan, Canada, United Kingdom and France, plus international organizations such as the World Bank. Future developments of pooled funds in Asia and the Pacific should involve the engagement of funding institutions across the globe. Risk pooling mechanisms in Asia and the Pacific can involve the participation of international organizations such as the UNESCAP to create a platform for discussion on the agreed terms and conditions.

Moreover, risk pooling mechanisms in Asia and the Pacific can consider innovative financing tools in their portfolio. The CCRIF is looking at catastrophe bonds and collateralized reinsurance as part of its risk transfer toolkit, based on the recognition that

the pool currently has too much reliance on traditional reinsurance markets. The inclusion of a wider variety of financial instruments can help lower risk through utilizing the unique advantages of each product. Over the years, the CCRIF has attracted participation of many institutional investors to become more involved in the capital markets, such as developing CAT bonds and collateralized insurance schemes.²⁰ Asia and the Pacific risk pooling initiatives can learn from this experience. At the moment both risk pooling mechanisms for DRR and CAT-linked securities are at early stages of development, and there are many opportunities in utilizing them together for building resilience to natural disasters.

²⁰https://unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/s4_is_sac_presentation_for_unfccc_scf_june_2014.pdf.

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