

## Insurance, Developing Countries and Climate Change

Joanne Linnerooth-Bayer<sup>a</sup>, Koko Warner<sup>b</sup>, Christoph Bals<sup>c</sup>,  
Peter Höppe<sup>d</sup>, Ian Burton<sup>e</sup>, Thomas Loster<sup>f</sup> and Armin Haas<sup>g</sup>

<sup>a</sup>International Institute for Applied Systems Analysis (IIASA), Schlossplatz 1, A-2364 Laxenburg, Austria.

<sup>b</sup>United Nations University Institute for Environment and Human Security (UNU-EHS), UN Campus, Hermann-Ehlersstr 10, D-53113 Bonn, NRW 53113 Germany.

<sup>c</sup>Germanwatch e.V., Dr. Werner-Schuster-Haus, Kaiserstr 201, D-53113 Bonn, Germany.

<sup>d</sup>Munich Re GeoRisks Department, Königinstr 107, D-80802 Munich, Germany.

<sup>e</sup>Munich Re Foundation, D-80791 Munich, Germany.

<sup>f</sup>Munich Re Foundation, 26, St. Anne's Road, Toronto, ON M6J 2C1, Canada.

<sup>g</sup>Potsdam Institute for Climate Impact Research (PIK), Telegrafenberg A 31, 14473 Potsdam, Germany.

By providing financial security against droughts, floods, tropical cyclones and other forms of weather extremes, insurance instruments present an opportunity for developing countries in their concurrent efforts to reduce poverty and adapt to climate change. By pricing risk, insurance provides incentives for reducing risks and adapting to climate change; if these premiums are not affordable to the most vulnerable, donors can combine premium support with risk-reduction measures. In this paper, we examine the costs, benefits and risks of public-private (and donor supported) insurance programmes that offer affordable economic security to vulnerable communities and governments. Insurance mechanisms are of particular interest to climate negotiators seeking strategies that help vulnerable countries adapt to increasing severity and frequency of weather disasters, and we examine the case for including insurance mechanisms in a climate adaptation strategy expected to be agreed in Copenhagen in 2009. We present a proposal for this purpose that has been recently put forward by the Munich Climate Insurance Initiative (MCII), which calls for international solidarity for very low probability and high consequence weather-related events (high-risk layer). For middle-layer risks the MCII proposal calls for international support to promote sustainable, affordable and incentive-compatible insurance programmes that serve the poor without crowding out private sector involvement.

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### Introduction

More than three-quarters of recent economic losses caused by natural hazards can be attributed to windstorms, floods, droughts and other climate-related hazards,<sup>1</sup> which appear to be increasing at a greater rate than geophysical disasters.<sup>2</sup> This trend can be largely attributed to changes in land use and increasing concentration of

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<sup>1</sup> Munich Reinsurance Company (2007).

<sup>2</sup> UNISDR (2007).

people and capital in vulnerable areas, for example, in coastal regions exposed to windstorms and in fertile river basins exposed to floods.<sup>3</sup> As indicated by the greater increase in weather-related disasters compared to geophysical disasters, climate change also appears to be a factor in increased disaster losses. The Intergovernmental Panel on Climate Change<sup>4</sup> has predicted that climate change will increase weather variability as well as the intensity and frequency of weather-related extremes. There is also mounting evidence that climate change is contributing to increasing current risks.<sup>5</sup>

In the past quarter-century, over 95 per cent of deaths from natural disasters occurred in developing countries, and direct economic losses (averaging US\$100 billion per annum in the last decade) in relation to national income were more than twice as high in low-income as opposed to high-income countries.<sup>6</sup> These disaster statistics do not (for the most part) reflect long-term indirect losses, which can be very significant, particularly in countries with little capacity to respond and recover. Not only are there considerable differences in the human and economic burden of disasters in developed versus developing countries, but also in insurance cover. In the richest countries about 30 per cent of losses in the period 1980–2004 (totalling about 3.7 per cent of Gross National Product (GNP) were insured; in low-income countries, only about 1 per cent of losses (amounting to 12.9 per cent of GNP) were insured. Owing to the lack of insurance, combined with exhausted tax bases, high levels of indebtedness and limited donor assistance, many highly exposed developing countries cannot raise sufficient capital to replace or repair damaged assets and restore livelihoods following major disasters, exacerbating the impacts of disaster shocks on poverty and development.<sup>7</sup>

Developing countries with very low catastrophe insurance penetration represent a challenging and under-served market for the private insurance sector. Entrepreneurs are beginning to find ways to provide insurance for the lower end of the market, particularly through micro-insurance products that are made accessible by support from civil society and the public sector. This market is only feasible if premiums are affordable to the poor, which opens an opportunity for negotiators seeking opportunities for helping the most vulnerable adapt to climate change.

The case for including insurance and other risk-transfer instruments in a climate adaptation strategy builds on a growing recognition that the developed world, because of its emissions of greenhouse gases, is contributing to weather-related losses in the developing world. The so-called Copenhagen Agreed Outcome, which will determine the new post-2012 international climate regime, is expected to include both targets and action plans for the reduction of greenhouse gases (mitigation) as well as a framework to facilitate adaptation to the negative effects of climate change that can no

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<sup>3</sup> Mileti (1999).

<sup>4</sup> IPCC (2007).

<sup>5</sup> Solomon *et al.* (2007).

<sup>6</sup> Munich Reinsurance Company (2007).

<sup>7</sup> Gurenko (2004); Linnerooth-Bayer and Mechler (2007); Barnett *et al.* (2008).

longer be mitigated. It is under the adaptation agenda that insurance solutions are now under serious consideration.<sup>8</sup>

The MCII has proposed a climate risk management module to be included in the adaptation agenda. Fully funded by an adaptation fund or other financial mechanism emerging from climate negotiations in Copenhagen in 2009, this module would provide support for weather-related disaster prevention and insurance in vulnerable countries. This paper presents the insurance “pillar” of MCII’s proposed risk management module. As background, we begin in the next section by discussing the status of micro- and sovereign-catastrophe insurance programmes currently in place for serving developing country households, businesses and governments. In the third section, we examine their benefits, risks, costs and affordability. We argue that the private sector, acting alone, cannot provide adequate security to low-income clients, an argument that forms the rationale for support from a climate adaptation strategy. The rationale for including insurance in a climate adaptation regime rests not only on the failure of the market to serve the most vulnerable, but as we argue in the fourth section, it is also based on the prospect that insurance mechanisms can help reduce the impacts of these events. In the fifth section, we describe the MCII proposal for a two-tiered Insurance Pillar, financed by a Copenhagen Agreed Outcome financial mechanism, to (1) absorb a part of the high-level risks in vulnerable countries; and (2) enable micro- and sovereign-insurance systems to absorb middle layer risks. This Insurance Pillar would be part of a broader climate risk management strategy, which includes an interlinked prevention pillar.

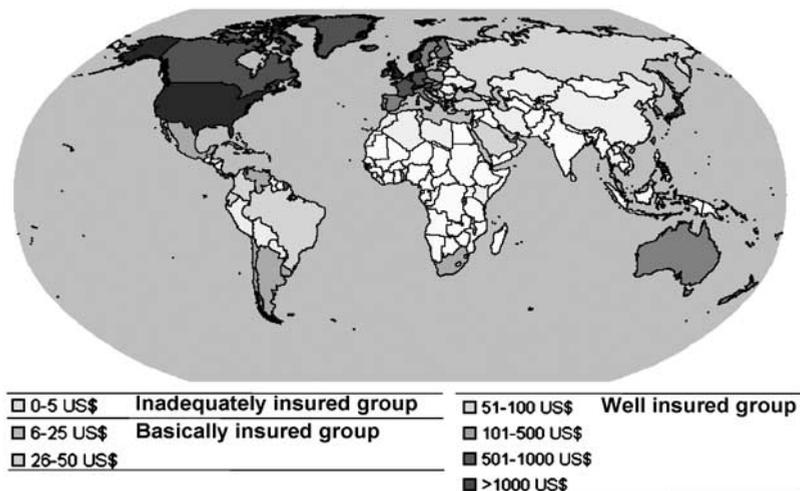
### **Disaster risk financing in developing countries**

Insurance instruments are only one of many activities involved in managing risks of natural hazards. The first, and arguably the highest priority in risk management, is investing in preventing or mitigating human and economic losses. Disaster mitigation and prevention can take many forms: reducing exposure to risks, (e.g. land-use planning); reducing vulnerability (e.g. retrofitting high-risk buildings) or creating institutions for better response (e.g. emergency planning). The residual risk can then be managed with insurance and other risk-financing strategies for the purpose of providing timely relief and assuring an effective recovery. Importantly, insurance can be designed to reward preventive behaviour, and in this way it can directly contribute to disaster loss reduction.

Most commercial disaster insurance is held by citizens of high-income countries (per capital income greater than US\$9,361), although even in these countries less than a third of disaster losses are insured. Not surprisingly, the picture is quite different for countries outside of the high-income bracket. Insurance density drops from around a third to less than a tenth in emerging economy countries, and it is almost negligible (1–2 per cent) in low-middle and low-income developing countries. As pictured below, in the U.S., parts of Europe and Australia, the average person pays over US\$500 in

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<sup>8</sup> UNFCCC (2008).



**Figure 1.** Global distribution of insurance premiums per capita.

*Source:* Munich Reinsurance Company (2006) Global distribution of insurance premiums per capita. Nat Cat SERVICE, Geo Risks Research, Munich Reinsurance Company, Munich.

property insurance premium compared to Africa and parts of Asia with less than US\$5 in premium (Figure 1).

Instead of insurance, households and businesses rely extensively on post-disaster public assistance. This is the case even in high-income countries. In the U.S., for instance, the federal government provides extensive assistance to private victims. Taking the 1994 Northridge earthquake as an example, only about 30 per cent of total direct private and public losses were absorbed by private insurance companies. In stark contrast, in the U.K., which claims 75 per cent flood insurance penetration, the government gives little assistance to private victims. As noted above, insurance is practically non-existent in least developed countries, and public assistance tends to be far lower. As a typical case, after the severe flooding in Sudan in 1998, the victims themselves absorbed over 80 per cent of the losses.

In addition to relying on public assistance, households, farmers and governments in the developing world have many opportunities for financing their recovery after disasters. As shown in Table 1, individuals can take out emergency loans from their family, micro-credit institutions or money lenders; sell or mortgage assets and land or rely on public and international aid.<sup>9</sup> Likewise, governments raise post-disaster capital by diverting funds from other budgeted programmes, borrowing money domestically or taking loans from international financial institutions. Individuals may also make arrangements before the disaster: setting up mutual arrangements with family, micro-savings and food storage. Similarly, governments can spread risks temporally or spatially by putting a reserve fund in place, making contingent credit arrangements or forming regional pools.

<sup>9</sup> Warner *et al.* (2007).

These informal mechanisms for financing disasters can be less costly and thus more affordable and accessible to very low-income individuals and governments. Yet, although informal financing appears to work reasonably well for low-loss events, it is often unreliable and inadequate for catastrophic events.<sup>10</sup> At the public level, it is well known that if governments can spread their post-disaster costs over a large tax base, or other lower-cost financing strategies, they should be risk neutral and not purchase insurance.<sup>11</sup> However, in the aftermath of heavy devastation in their countries, low-income developing countries may face exhausted tax bases, little reserves and declining credit ratings making external borrowing difficult.<sup>12</sup>

Finally, external assistance is limited, and with the exception of highly publicised disasters it is usually inadequate to meet post-disaster needs. International support for victims of the 2006 Indian Ocean tsunami was estimated at about \$7,000 per affected victim, which was exceptional. On average, international post-disaster assistance has approximated 10 per cent of direct economic losses,<sup>13</sup> and it can be much less. For example, support for victims of the devastating floods affecting Bangladesh in 1998 was estimated at about US\$3 per affected victim.<sup>14</sup> Nor can governments rely on post-disaster assistance. As a typical case, 2 years following the 2001 earthquake in Gujarat, assistance from international sources had reached only 20 per cent of original commitments.<sup>15</sup>

The inaccessibility of sufficient and affordable capital to support the recovery process in highly vulnerable countries is the main rationale for donor organisations, and also for a climate adaptation regime, to provide assistance to insurance programmes. Switching from post-disaster humanitarian assistance to providing pre-disaster security through insurance instruments also has benefits to donors.<sup>16</sup> Because insurance instruments can provide strong incentives for reducing risks, a point we will cover later, *ex-ante* support of insurance eventually reduces the need for outside assistance.

## Disaster insurance for developing countries

Donors and international financial institutions are increasingly supporting insurance systems in the developing world.<sup>17</sup> A number of innovative pilot programmes are providing insurance to farmers, property owners and small businesses, as well as transferring the risks facing governments to the international capital markets. Examples include index-based crop and livestock insurance systems in Malawi<sup>18</sup> and

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<sup>10</sup> Cohen and Sebstad (2003).

<sup>11</sup> Arrow and Lind (1970).

<sup>12</sup> Mechler *et al.* (2006).

<sup>13</sup> Mechler (2004).

<sup>14</sup> Tsunami Evaluation Committee (2006).

<sup>15</sup> World Bank (2003).

<sup>16</sup> Warner *et al.* (2005).

<sup>17</sup> Linnerooth-Bayer *et al.* (2005).

<sup>18</sup> Suarez *et al.* (2007); Hess and Syroka (2005a).

Mongolia,<sup>19</sup> property insurance in Turkey;<sup>20</sup> a regional catastrophe insurance pool for the Caribbean Island States,<sup>21</sup> and the issuance of a catastrophe bond by the Mexican government.<sup>22</sup>

These and other donor-supported insurance systems are for the most part still in a pilot stage, and none has experienced a major and widespread catastrophic event. It is too early, thus, to fully assess their effectiveness in reducing economic insecurity. In examining this early experience, the broader question arises whether developing countries should, indeed, follow the path of the developed world in insuring against catastrophic events, and which insurance instruments and modifications may be appropriate for better tackling the developmental dimensions of natural disasters? This question is especially topical given the insurance controversies following Hurricane Katrina's devastation of poor communities in New Orleans. In what follows, we briefly discuss the benefits, risks, costs and affordability of disaster insurance based on early experience in developing countries.

### *Benefits*

By providing low-income households, farmers and businesses with the right to post-disaster liquidity, thus securing their livelihoods, insurance instruments can lessen the burdens from disasters and expedite the recovery process. For many, an insurance contract is more dignified and secure than dependency on the *ad hoc* generosity of donors. As insured households and farms are more creditworthy, insurance can also promote investments in productive assets and higher-risk/higher-yield activities. Insurance instruments, if designed carefully to avoid moral hazard, can also provide incentives to reduce risk, a point we will return to in the next section.

For governments, insurance instruments can also have large pay-offs by reducing the risk of a post-disaster financial gap and thus ensuring the timely repair of public infrastructure and provision of relief expenditures. Just like investments in prevention, timely relief and reconstruction can save lives and livelihoods and prevent disaster-induced poverty traps.<sup>23</sup> With internationally backed risk-transfer programmes, developing country governments will rely less on debt financing and international donations, and assured funds for repairing critical infrastructure will attract foreign investment.

### *Risks*

As recent and past experience in developing and developed countries shows, there are also risks to an insurance strategy. Broadly, these risks can be categorised as resulting from:

- the potential insolvency and non-sustainability of insurance systems;

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<sup>19</sup> Skees and Enkh-Amgalan (2002).

<sup>20</sup> Gurenko *et al.* (2006).

<sup>21</sup> Ghesquiere *et al.* (2006).

<sup>22</sup> Cardenas *et al.* (2007).

<sup>23</sup> Barnett *et al.* (2008).

- moral hazard, adverse selection and basis risk; and
- institutional stability, public confidence and trust.

In the absence of strong regulatory frameworks, many micro-insurance systems operating in low-income communities have insufficient backup capital and are thus exposed to high insolvency risks.<sup>24</sup> These risks can be reduced by strengthening market regulation and also by providing outside support to ensure the solvency and stability of local and national systems. For example, the World Bank has created a contingent credit facility to provide backup for the Turkish Catastrophe Insurance Pool (TCIP), which will cover risks that an earthquake occurs before sufficient premium has been collected.<sup>25</sup> This support can increase public confidence and trust in the system.

Moral hazard can also be effectively addressed by setting up index-based systems. In the Malawi pilot micro-insurance project, for example, insurance claims by smallholder farmers are triggered by precipitation falling below a prescribed level as measured by local weather stations. Not only is moral hazard reduced, but also there is no need for expensive individual claims settling, and expedient payments will reduce the need for farmers and herders to sell their assets and livestock to survive the aftermath of a disaster. However, basis risk remains a problem.<sup>26</sup>

Finally, in developing countries institutional stability and trust can be an issue. In Malawi, interviews with the participating bank revealed a strong distrust in the stability of the partner insurance company. Without World Bank involvement, the bank interviewee revealed that the bank would not participate in the programme.<sup>27</sup> This lack of institutional trust can be a constraining factor in up-scaling these systems beyond the donor-supported pilot phases.

### *Costs*

The benefits of insurance make it a potentially integral part of an overall disaster risk management strategy. However, these benefits can be costly. Insurers offering cover for co-variant risks face large, stochastic losses and thus must hold capital reserves, diversify or purchase reinsurance, all of which “load” or add to the actuarially risk-adequate technical premium. Moreover, providing insurance on a small scale involves high administrative costs in reaching clients, estimating and underwriting risks, and handling claims. This is also the case for sovereign risk transfer. The expenses of issuing the above-mentioned Mexican catastrophe bond, for example, amounted to about 2 per cent of the cover amount. This substantially exceeds this cost for traditional reinsurance, which normally approximates 1 per cent.<sup>28</sup>

As shown in Figure 2, the costs of catastrophe insurance exceed the annual expected loss by an expense load and contingency load. The expense load includes the transaction costs in administering the system: costs of starting up, underwriting, etc.

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<sup>24</sup> Mechler *et al.* (2006).

<sup>25</sup> Gurenko *et al.* (2006).

<sup>26</sup> Suarez *et al.* (2007).

<sup>27</sup> *Ibid.*

<sup>28</sup> Lane (2004).

**Table 1** Examples of pre- and post-disaster risk financing arrangements

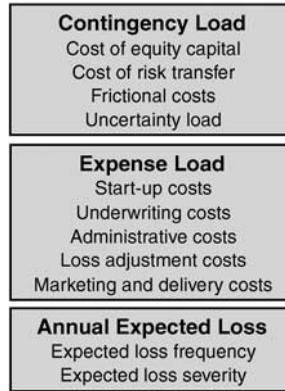
	<i>Security for loss of assets (households/businesses)</i>	<i>Food security for crops/ livestock loss (farms)</i>	<i>Security for relief and reconstruction (governments)</i>
<i>Post-disaster (ex-post)</i>	Emergency loans; money lenders; public assistance	Sale of productive assets, food aid	Diversions; loans from World Bank and other IFIs; international assistance
<i>Pre-disaster (ex-ante)</i>			
Non-market	Kinship arrangements	Voluntary mutual arrangements	
Inter-temporal	Micro-savings	Food storage	Catastrophe reserve funds, regional pools, contingent credit

The contingency load can be far greater, and includes not only the costs of equity capital and risk transfer, but also frictional costs and an uncertainty load. According to Cummins and Mahul,<sup>29</sup> frictional costs result from informational asymmetries between capital markets and the insurer's management. As global capital markets have less information about the insurer's exposure to catastrophic risk and the adequacy of its loss reserves than do the firm's managers, the capital market may charge a higher cost of capital to provide a margin for the informational asymmetry. Adding to the problem of asymmetric information, insurers may load the premium to account for uncertainty and ambiguity in the risk estimates. Because of the transaction and capitalisation costs, and arguably the extra premium that insurers demand to take on for ambiguous and uncertain risks, catastrophe insurance premiums can be substantially higher than expected losses.

### *Affordability*

Many in the developing world cannot afford risk-based premium payments and remain dependent on post-disaster aid and other forms of financing discussed earlier and shown in Table 1. The inability of very low-income clients to pay insurance premiums sheds doubt on a common view among development and climate adaptation experts, that is, that the private sector, if assured proper market conditions, can act alone to provide sufficient catastrophe insurance coverage throughout the developing world. Proponents of this argument point to the success of emergent micro-credit and micro-insurance systems serving the poor. These programmes cover independent and often less costly damages, such as health and funeral expenses, and thus are more affordable than catastrophe cover premiums, which as discussed above reflect large uncertainties, ambiguities and capitalisation costs. A review of catastrophe insurance

<sup>29</sup> Cummins and Mahul (2008).



**Figure 2.** Catastrophe insurance premium decomposition.  
*Source:* Cummins and Mahul (2008).

coverage in Asia, Africa and Latin America shows that, almost without exception, programmes targeting the poor operate with subsidies, capitalisation or other forms of support from the government or international development agencies, or they offer very minimal cover.<sup>30</sup>

The Disaster Preparedness Programme operating in India's highly hazard-exposed Andhra Pradesh region provides an example. In partnership with a commercial insurer, this programme offers multiple-hazard insurance coverage for property and life risks to groups of women with a minimum size of 250 members. Since 2000, the Indian regulatory authority has required insurers to service the low-income segment of society, and many insurers offer affordable contracts to low-income communities made possible by cross subsidies from their other lines of business and wealthier clients. As a second source of subsidy, the U.K.-based donor NGO, Oxfam, paid 50 per cent of the premium in the first year. Furthermore, Oxfam actively convinced the private insurer to offer very low-cost insurance by training disaster management volunteers, who assist in providing insurance services such as helping communities in the claims process.<sup>31</sup>

Other programmes are made affordable by offering limited cover. The non-subsidised insurance system in Malawi covers only the bank loans for hybrid seeds and does not insure farmers' livelihoods.<sup>32</sup> Moreover, start-up costs including the preparation of risk assessments, the business plan and suitable institutional arrangements were supported by the World Bank and World Food Programme. The above-mentioned TCIP is hailed as a non-subsidised national earthquake insurance programme.<sup>33</sup> Yet, premiums are indirectly reduced by a World Bank con-

<sup>30</sup> Mechler *et al.* (2006).

<sup>31</sup> Krishna (2005); Mechler *et al.* (2006).

<sup>32</sup> Suarez *et al.* (2007).

<sup>33</sup> Cummins and Mahul (2008).

tingent loan facility that absorbs a layer of risk at very low cost. Moreover, the system covers mainly middle-income property owners; very poor households in rural areas are excluded from the pool and continue to rely on post-disaster public relief.

Notably, with the exception of the TCIP, there are no national hazard insurance systems operating in the developing world, such as the public-private systems in the U.S., France, Norway, New Zealand, Japan and several other highly exposed developed countries. These partnerships do not solve the fundamental problem that the citizens of poor, small and highly exposed countries cannot collectively afford to be paying members of a national risk or solidarity pool for extreme losses. International support is an important prerequisite for serving poorer countries and regions.

### **Insurance and adaptation**

The rationale for including insurance in a climate adaptation regime rests not only on the failure of the market to serve the most vulnerable, but also on the prospect that insurance mechanisms that help countries and affected households recover from extreme weather events can at the same time help reduce the impacts of these events.<sup>34</sup> This is referred to in the climate community as adaptation, and can be defined as reducing risks to property, assets, livelihoods and lives. Adaptation can take many forms, including:

- improvements in physical systems, for example flood defences or early warning systems;
- shifts in social systems, for example relocating or changing livelihoods; training for early warning systems;
- mitigating underlying vulnerabilities, for example improving productivity and thus enabling savings as a cushion for future disasters.

Insurance can promote these risk-reduction activities by (i) offering premium reductions and other incentives for decreasing risks; (ii) coupling insurance support with requirements for risk reduction; and (iii) promoting productivity that enables the long-term reduction in losses.

*Risk reduction through incentives:* Insurance can reduce direct and immediate disaster losses by providing incentives for pre-disaster mitigation measures. Researchers have shown, for example, how the drought micro-insurance scheme in Malawi (described above) can be redesigned to provide farmers an incentive to reduce their drought-related crop losses.<sup>35</sup> This is possible by incorporating seasonal rainfall forecasts, which are strongly related to El Niño – Southern Oscillation, into insurance pricing. If a seasonal precipitation forecast indicates that a drought is likely or unlikely to strike a certain area, this information can help farmers choose a drought-resistant crop variety or engage in high-yield (and high-risk) farming practices, respectively. This information can be even more powerful if seasonal forecasting is combined with risk transfer schemes that adjust premiums upwards in El Niño years when bad rains are expected and adjust

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<sup>34</sup> Hoff *et al.* (2005).

<sup>35</sup> Suarez *et al.* (2007); Suarez and Linnerooth-Bayer (forthcoming).

them downwards in La Niña years to reflect the reduced risk of drought.<sup>36</sup> Premium adjustments can lead to substantial increases in gross revenues for farmers during La Niña years, and substantially reduce losses during El Niña years. By smoothing their incomes, farmers are thus more able to withstand the negative impact of future droughts on agricultural production.

*Coupling insurance with risk reduction:* As a more direct route to promoting adaptation, the provision of insurance can be made conditional on risk-reduction measures. This is the idea underlying the U.S. National Flood Insurance Programme, where communities are required to put land-use and other mitigation measures in place in order for their residents to be eligible for subsidised insurance policies.<sup>37</sup> This same principle can be applied to donor assistance, which in some cases is switching from project-oriented aid to direct cash transfers to the poor. These transfers might be made conditional on the recipients purchasing insurance. In Mexico, as a case in point, cash transfers to female heads of poor households are conditional on them providing their children with education and health care, and it would be a small step to make these transfers conditional on their uptake of insurance against disasters and other threats to their livelihoods.<sup>38</sup>

Oxfam America and Swiss Re are experimenting with a similar concept of coupling donor-supported insurance with risk reduction. In the Ethiopian village of Adi Ha, farmers can purchase a micro-insurance product to protect them against drought loss to their teff crop. Farmers not able to afford insurance can join a programme that allows them to pay for part of their insurance premium with labour in the off-season. Oxfam is considering orienting the work programme to projects that mitigate drought risk. Thus, the donor-funded “food for work” and disaster aid programme is re-designed to a donor-funded “insurance for risk reduction work” programme.<sup>39</sup>

*Insurance for enhancing productivity and adaptation:* Finally, well-designed insurance can encourage investments that enhance productivity and in this way promote adaptation. Continuing the example of drought micro-insurance in Malawi, the pilot scheme bundles insurance with credit that enables farmers to purchase more productive seeds. With a doubling of their cash crop in good seasons, farmers are better able to save money for those years characterised by drought and lower productivity. As discussed earlier, the Malawi scheme eliminates moral hazard since claims are not based on crop losses. Thus, farmers have an incentive to adapt cultivation practices to become more resistant to drought.

## **The MCII proposal**

In the previous sections, we have argued that catastrophe insurance coverage in the developing world proffers large benefits for low-income households, businesses and

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<sup>36</sup> Osgood *et al.* (2007).

<sup>37</sup> Kunreuther (2006).

<sup>38</sup> Linnerooth-Bayer *et al.* (forthcoming).

<sup>39</sup> *ibid.*

governments, and if well designed, can encourage or require the reduction of risks; yet, the costs can be prohibitive to low-income clients. The private sector acting alone, thus, cannot be depended upon to provide products that comprehensively serve the most vulnerable. This presents an opportunity for development organisations, and also for the climate community in its pursuit of strategies for helping developing countries adapt to climate change.<sup>40</sup>

The idea of insurance as part of an adaptation strategy has a history in the climate change negotiations. Article 4.8 of the United Nations Framework Convention on Climate Change (UNFCCC) calls upon Convention Parties to consider actions, including insurance, to meet the specific needs and concerns of developing countries arising from the adverse impacts of climate change,<sup>41</sup> and Article 3.14 of the Kyoto Protocol explicitly calls for consideration of the establishment of insurance.<sup>42</sup> In 1992, the Alliance of Small Island States put forth the idea of a global compensation fund, fully financed by industrialised countries for the purpose of compensating low-lying states for sea-level rise damages. The AOSIS proposal addressed what is arguably an uninsurable risk (i.e. sea-level rise is gradual and predictable) for which the victims have little responsibility.<sup>43</sup>

The AOSIS proposal and other early efforts aimed at funding strictly climate change-related activities, but there are increasing calls that adaptation should be driven by vulnerability and poverty, and that it should be mainstreamed into the development process.<sup>44</sup> The 2007 Bali Action Plan, which charted the course for reaching agreement on a replacement for the Kyoto Protocol expiring in 2012, specifically calls for “consideration of risk sharing and transfer mechanisms, such as insurance, as a means to address loss and damage in developing countries that are particularly vulnerable to climate change”.<sup>45</sup> The Plan strengthens the mandate to consider insurance instruments as set out by the UNFCCC and the Kyoto Protocol.<sup>46</sup>

The Copenhagen climate agreement, which should be signed in December 2009, is expected to place emphasis on adapting to climate impacts in addition to mitigating climate change. Estimates for the additional costs of adapting to climate change in developing countries, although speculative and uncertain, range from about US\$30 billion to almost US\$90 billion per year over the next 5–20 years.<sup>47</sup> There are numerous proposals for raising these sums,<sup>48</sup> guided by Article 3.1 of the Framework Convention, which states that “Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective

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<sup>40</sup> Linnerooth-Bayer *et al.* (forthcoming).

<sup>41</sup> United Nations (1992).

<sup>42</sup> United Nations (1997).

<sup>43</sup> AOSIS proposed an updated insurance proposal in 2008, with three elements: risk management, rehabilitation/compensation and insurance (AOSIS, 2008).

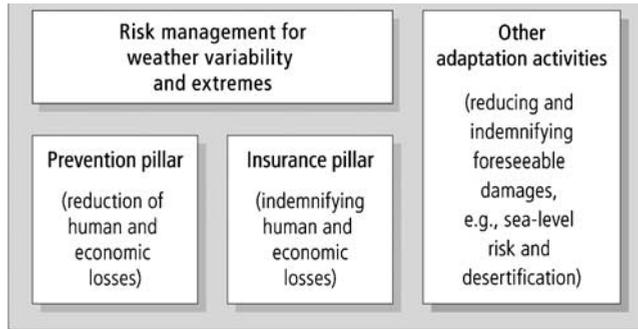
<sup>44</sup> Kartha *et al.* (2006).

<sup>45</sup> UNFCCC (2007).

<sup>46</sup> Harmeling and Bals (2008).

<sup>47</sup> Smith (2007).

<sup>48</sup> Müller (2008).



**Figure 3.** The MCII proposed climate risk management module.

capabilities”. It is anticipated that funding for adaptation will be the primary responsibility of developed countries, whereas the recipients will be mainly in the developing world.

Proposals are also emerging that suggest mechanisms on how to disburse adaptation funds. One example is the Swiss submission to COP12 in Nairobi (December 2006), which proposed that revenues from a global carbon levy be disbursed into two types of funds: National Climate Change Funds and a Multilateral Adaptation Fund. The multi-lateral adaptation fund would be spent on two pillars: *prevention and insurance*.

Building especially on the Swiss submission, the MCII has proposed the design and operation of a climate risk management module including insurance.<sup>49</sup> As illustrated in Figure 3, this module would form one element of a comprehensive adaptation strategy and would be fully financed by adaptation funding created by the Copenhagen Agreed Outcome. Like the Swiss proposal, this module includes two pillars, prevention and insurance, which would act together to reduce the human and economic burdens of extreme weather and weather variability on developing countries.

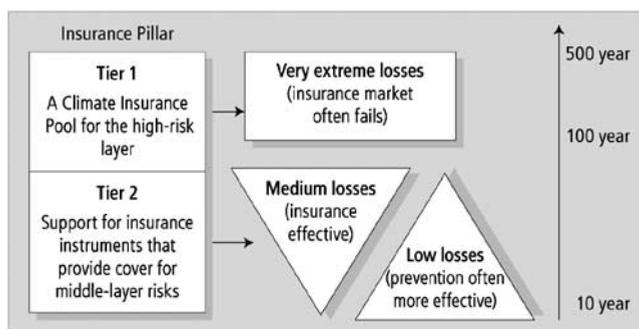
The Prevention Pillar of the MCII proposal would provide vulnerable country governments, NGOs, businesses and citizens with expert advice and financial resources for mitigating losses from weather extremes and variability. The purpose of this pillar is to foster investments in reducing vulnerability and thus the human and economic losses from weather extremes and variability, and enable climate-resilient development.<sup>50</sup> The institutional context and procedures for providing this support would be detailed by a UNFCCC task force for this purpose. It is beyond the scope of this paper to discuss the workings of the prevention pillar, except for the interactions of insurance with risk reduction.

Turning to MCII’s Insurance Pillar, as pictured in Figure 4, it would have two tiers reflecting the layers of risk that need to be addressed for effective adaptation:

- *high-level risk* that exceeds the ability of any given country to pay in the case of an extreme event; and

<sup>49</sup> MCII (2008).

<sup>50</sup> UNFCCC (2007); Harmeling and Bals (2008, p. 10ff).



**Figure 4.** A two-tiered insurance pillar.

- *middle-level risk* that is within the ability of any given country to cope if the proper facilitating framework were in place.

Low-level risks, such as frequently recurring dry seasons or heavy rains, are not addressed in the MCII Insurance Pillar as they can often be more cost effectively met by activities supported by the Prevention Pillar, rather than through insurance. The exclusion of low-level risk from the Insurance Pillar also avoids moral hazard for those risks that are easily preventable.

Keeping in mind that insurance penetration is low in developing countries, and almost negligible in Least Developed Countries (LDC), the MCII proposal bridges the insurance gap with its two tiers. The first tier provides insurance cover to developing countries falling victim to infrequent and severe weather-related events. The premiums would be fully financed from an adaptation fund or other financial mechanism agreed in Copenhagen, which itself would presumably be funded by wealthy developed countries. For medium-level risks, the second tier supports local, national and regional insurance programmes to enhance their affordability to the most vulnerable.

### *Insurance Pillar Tier 1*

Tier 1 of the Insurance Pillar takes the form of a Climate Insurance Pool (CIP), which would provide insurance to eligible vulnerable countries.<sup>51</sup> By pooling the risks across the developing world, far less reserve capital is needed than if each country creates its own catastrophe fund for this same purpose. Although many details and institutional arrangements for the CIP would need to be worked out, for instance by the UNFCCC task force, it is generally described below.

The CIP would cover an agreed proportion of a pre-defined high layer of risk in eligible countries. The scope could range from public property and infrastructure to private property, lives and livelihoods. The measure triggering payment from the CIP (indemnity or index based) will be based on negotiated criteria of risk and vulnerability, as well as an independent and objective assessment to ascertain that

<sup>51</sup> Bals *et al.* (2006); Hoeppe (2008); Hoeppe and Gurenko (2006).

the event is, in fact, extraordinary in the statistical sense that it lies in the extreme percentile of the historic distribution, and that country governments and their citizens would have difficulty coping with these losses. Any threshold deemed as a trigger for compensation would need to avoid the problem that climate change renders “extraordinary events” as “ordinary”. If, for example, the payout trigger for a participating country is a Category X hurricane, this trigger would not change even if hurricanes in this category became more frequent.

This means that claims on the CIP will likely increase as climate change worsens the frequency and intensity of weather-related disasters, in turn, increasing the annual allocation from the negotiated financial mechanism. This allocation would approximately equal the expected average annual costs of the insurance scheme plus costs of administering the system, and reinsurance could be sought to cover extraordinary claims on the scheme. Climate change should not overly tax the system given that extreme disaster losses in the developing world will likely remain minor in comparison to losses in wealthy countries. Estimates on the requisite annual allocation to this fund at current risks range from about US\$5.1 billion<sup>52</sup> to about US\$8 billion, which can be compared to the over US\$60 billion insured loss from the single event of Hurricane Katrina in 2005.

The CIP bears some similarity to the European Solidarity Fund (EUSF), which provides payments to countries within the European Union that experience disasters resulting in losses of a set percentage of their GDP.<sup>53</sup> Unlike the EUSF, however, the CIP will be fully paid out of a negotiated financial mechanism, and presumably by those countries that have contributed to losses in the developing world owing to their emissions of greenhouse gases. Critics may argue that separating the recipient of insurance from the obligation to pay the premium can encourage risky behaviour or mal-adaptation. The scheme can reduce this moral hazard, and more importantly actually encourage risk-reduction activities by:

- basing pay-outs on parametric triggers;
- instituting deductibles (the scheme pays only a pre-negotiated portion of losses);
- linking eligibility to compliance criteria that are linked to the prevention pillar;
- meeting basic fiscal standards.

Not only can the CIP be closely coupled with preventive measures, but the premium-paying countries have an added incentive to support risk prevention in the developing world through the Prevention Pillar, as this will reduce their payments to the Insurance Pillar. Finally, post-disaster aid, which is the likely alternative to this high-layer insurance scheme, may be associated with even greater moral hazard.

Critics may also be concerned that a mechanism like the CIP will crowd out commercial insurance. This concern is less relevant for high-level risks in low-income countries. As noted in the *Disaster risk financing in developing countries* section, in the majority of developing countries, especially in the most vulnerable Small Island Developing Countries and the LDCs, commercial insurance markets are hardly existent. Even in wealthy countries the market often fails in providing cover for very

<sup>52</sup> Hoeppe (2008).

<sup>53</sup> EUSF (2002).

low-probability, high-consequence risks. The reasons for market failure are twofold: on the demand side, individuals are generally myopic and misperceive the seriousness of low-probability risks, and on the supply side, insurers are reluctant to cover risks that are uncertain and ambiguous.<sup>54</sup> Thus, rather than crowding out the private market, the proposed CIP scheme creates opportunities for the private sector to provide needed capitalisation through reinsurance arrangements.

### *Insurance Pillar Tier 2*

A second tier of the MCII proposal, as shown in Figure 4, would take the form of a Climate Insurance Assistance Facility (CIAF) that provides support for the middle layer of risk not compensated by the CIP described above.<sup>55</sup> The CIAF enables risk pooling and transfer mechanisms that provide cover for medium-loss events. It would not directly provide insurance to households, farmers or governments, but would offer support to nascent micro- or sovereign-insurance systems, like those described in this paper, for example, in Malawi and the Caribbean, respectively.

The core of this second tier is the provision of capacity-building and technical support, including such activities as collecting and disseminating weather data, (or making those collected from World Meteorological Organization (WMO) or private reinsurers available), carrying out risk assessments or supporting delivery systems. These and other forms of indirect support will render these systems more accessible and affordable to poor communities and governments. In addition, this tier can provide support by directly capitalising insurance programmes, or, alternatively, brokering pooling and reinsurance arrangements. The facility might in exceptional cases subsidise premiums but in ways that minimally distort incentives so as not to discourage risk-reduction activities.

A main advantage of providing support at a multi-national scale is economies of scale in developing an expert core to assist countries in their efforts to build insurance systems. This tier can also operate at smaller scales, for example, by means of regional facilities.

## **Conclusions**

The insurance industry, acting alone, cannot provide the services for creating fully adequate safety nets for the poor to adapt to climate change. Likewise, insurance alone will not address all adaptation challenges that arise with increasing climate risks. Yet, the international community and the private insurance sector, together with governments and NGOs, can provide financial security against droughts, floods, tropical cyclones and other forms of weather variability and extremes affecting developing countries. Insurance solutions, if supported by the international community, can be a strong complementary mechanism in a wider adaptation framework.

There is a strong rationale for including insurance in the adaptation strategy expected to emerge from the up-coming Copenhagen negotiations. Insurance offers vulnerable communities and governments security against the ravages of weather

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<sup>54</sup> Kunreuther (2006).

<sup>55</sup> Linnerooth-Bayer and Mechler (2007).

disasters, and can also promote productive investments that reduce their vulnerability. At the same time, the high costs of catastrophe cover can be prohibitive for low-income clients, and there are associated risks for local providers of cover for systemic risks. The failure of the market to serve the most vulnerable presents a rationale for supporting insurance as part of an adaptation strategy and this rationale is strengthened by opportunities for coupling insurance with risk reduction.

The proposal submitted by the MCII to include an Insurance Pillar in a climate adaptation strategy meets the challenge of providing support to promote sustainable, affordable and incentive-compatible insurance programmes with minimal crowding out of private sector involvement. If designed carefully to circumvent disincentives and moral hazard, the first tier, the CIP, can be closely coupled with preventive activities by making insurance support conditional on risk reduction. By enabling *insurance for the poor*, this tier opens opportunities for risk-transfer programmes involving the private market. Indeed, since the market currently fails for this risk layer, this proposal actually creates a new market for the private sector in reinsuring the CIP. The second tier, which supports nascent insurance systems that provide cover for middle-layer risks, imposes affordable prices on heretofore un-priced risks – thus replacing the negative incentives and moral hazard created by post-disaster aid – and creates ample opportunities for the private sector in insuring and reinsuring these programmes.

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## About the Authors

**Joanne Linnerooth-Bayer** leads IIASA's Programme on Risk and Vulnerability. Her current research focuses on financial solutions for low-income households and businesses to help them cope with their catastrophe risk exposures. Most recently, and as part of the EU integrated project, ADAM, Dr. Linnerooth-Bayer is endeavouring to put insurance and other risk-transfer mechanisms on the climate-adaptation agenda. In collaboration with Kyoto University and Beijing Normal University, she

organises an annual conference on Integrated Disaster Risk Management. She is a co-founder of MCII, the Munich Climate Insurance Initiative.

**Koko Warner** leads Climate Adaptation and Social Vulnerability Section at the United Nations University Institute for Environment and Human Security (UNU-EHS). She researches adaptation and climate risk insurance and financial mechanisms to assist the poor. Warner is an executive board member of the Munich Climate Insurance Initiative (MCII). She is pursuing a Habilitation at the ETH Zürich, Department for Environmental Science and Economics, and an assistant professor at the University of Richmond's Emergency Service Management graduate programme.

**Christoph Bals** is Executive Director Policy and founding member of the NGO Gemanwatch. He is the Vice Chairman of the Munich Climate Insurance Initiative (MCII) and was among the initiators of European Business Council for Sustainable Energy, the pro-Kyoto-campaign "e-mission55", and the initiative for climate conscious flying "atmosfair". He has been on the board of the "Foundation for Sustainability" since 1998. He is in the German government's working group on emission trading.

**Peter Hoppe** is Head of Munich Re's Geo Risks Research division. He is the chairperson of the Munich Climate Insurance Initiative. He studied meteorology and physics, specialising in the evaluation of environmental risks. Prof Höppe was the president of the International Society of Biometeorology and carried out diverse tasks for the WHO and WMO.

**Ian Burton** is Scientist Emeritus at the Meteorological Service of Canada. His research interests include risk assessment of environmental hazards, water resources and supply, and climate adaptation. Dr. Burton was Director of the International Federation of Institutes for Advanced Study, and Professor and Director of the Institute for Environmental Studies at the University of Toronto. He is a Fellow of the Royal Society of Canada and the World Academy of Arts and Sciences. He is a co-founder of MCII, the Munich Climate Insurance Initiative.

**Armin Haas** is a senior researcher at the Potsdam Institute for Climate Impact Research (PIK). He is interested in the interaction of financial markets and climate change. He leads the research group "Bayesian Risk Solutions". He is a co-founder and treasurer of MCII, the Munich Climate Insurance Initiative.

**Thomas Loster** is Chairman of the Munich Re Foundation. His work focuses on climate change and climate policy, and the aspects of insurance including social vulnerability, climate justice and micro-insurance. He was Head of Weather and Climate Risks Research in the Geo Risks Research Department. Mr. Loster headed the Climate Change Working Group (CCWG) of the UNEP-Finance Initiative (2003–2005). He is a co-founder of MCII, the Munich Climate Insurance Initiative.