



## Climate Change and Extreme Events: What Role for Insurance?

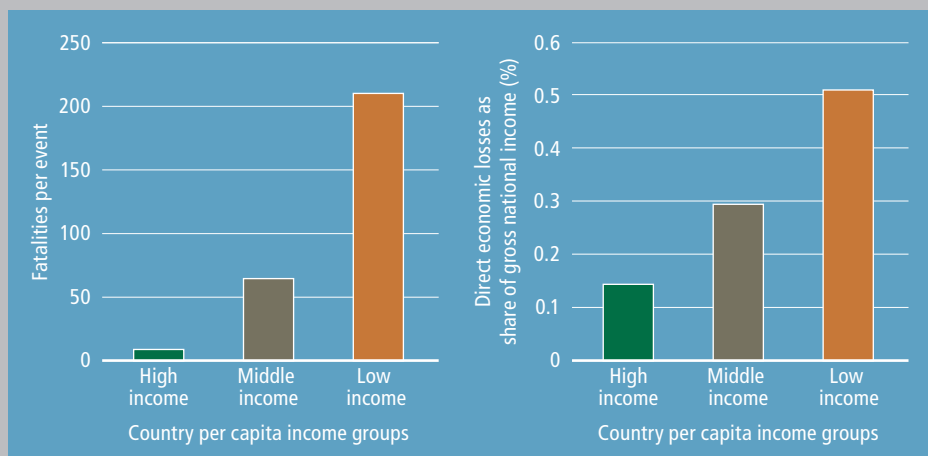
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Experts expect climate change to affect not just average temperature, but also weather variability and extreme weather events. The effects, including economic and human losses, impose a disproportionate burden on vulnerable developing countries. How can insurance, including public–private arrangements with international support, play a role in helping vulnerable countries adapt? This Policy Brief offers practical guidance to policymakers shaping the post-Copenhagen adaptation strategy.

### Key Points

- Natural disasters cause more deaths in low-income countries than in middle-income and high-income countries combined. Disasters also impose a greater economic burden, relatively speaking, on vulnerable developing countries. Lack of resources means such countries struggle to recover from disasters, exacerbating poverty.
- Climate change is expected to increase weather variability and extreme weather events particularly affecting developing countries. The UN Framework Convention on Climate Change recognizes the unfair burden and obliges developed countries to assist vulnerable countries.
- Although not a panacea for adapting to climate change, insurance instruments offer substantial benefits for low-income countries, both to reduce their vulnerability to weather variability and adapt to climate change. The Bali Action Plan calls upon policymakers to consider insurance as part of an adaptation strategy.
- Insurance enables vulnerable countries to exercise their “rights” to reliable, dignified post-disaster relief without sacrificing self-respect; it can contribute to reducing poverty by providing the pre-disaster security necessary for taking risky, high-return, investments.
- Novel risk-sharing arrangements, such as index-based insurance, can also encourage countries to invest in preventive measures, since claims depend on a physical trigger and not on actual losses.
- Due to the large capital-reserve requirements, the costs of insuring against natural disasters can be high if countries pursue the strategy alone. Coordination with other countries and engaging donor support can help make insurance affordable. This is also a promising strategy for development organizations: it provides them a secure planning horizon, leverages tight humanitarian budgets, and creates incentives for reducing losses and ultimately the need for post-disaster aid.
- A global mechanism for supporting pro-poor insurance as part of a post-Copenhagen adaptation strategy could provide affordable security at a lower cost by pooling national insurance programs.

**Figure 1**  
A disproportionate share of the human and economic burdens from natural disasters (1980–2004) falls on low-income and lower middle-income countries. (Source: IIASA calculations based on Munich Re, 2005)



## How are developing countries affected by weather variability and extremes?

Over 95 per cent of deaths from natural disasters in the last 25 years occurred in developing countries. Direct economic losses (averaging US\$ 100 billion per annum in the last decade) were more than twice as high in low-national-income countries as opposed to high-income ones (Figure 1). According to the United Nations International Strategy for Disaster Reduction (ISDR), more than three-quarters of recent economic losses can be attributed to windstorms, floods, droughts, and other climate-related hazards, and the Intergovernmental Panel on Climate Change (IPCC) has predicted that climate change will magnify these losses because of increasing weather variability.

Moreover, indirect losses that arise from the long-term consequences of disasters on economic development can greatly amplify the direct economic and human losses. Many highly exposed developing countries cannot fully recover by simply relying on limited external donor aid. In turn, external investors are wary of the risk of catastrophic infrastructure losses, while small firms and farmers cannot access the credit necessary for investing in higher-yield/higher-risk activities. This leads to slowed economic recovery, exacerbating poverty.

## When is it advisable for low-income households, businesses, and governments to insure against climate-related risks?

Insurance cannot be a panacea for governments, households, and businesses in those highly exposed and vulnerable countries trying to adapt to climate change. It is generally inappropriate for very slow-onset climate impacts, such as sea-level rise and desertification, where other instruments are needed.

Most importantly, insurance must be considered within an overall risk-management and adaptation strategy. The two top priorities are avoiding dangerous climate change and preventing human and economic losses.

Whether insurance is advisable depends on its benefits and costs. By spreading losses temporally and geographically, and assuring timely liquidity for the recovery and reconstruction process,

insurance is beneficial to those in the risk pool. And by enabling productive adaptation, insurance brings the added benefit of helping communities escape from disaster-induced poverty traps.

Yet the costs are high. Because the events can affect whole regions at the same time (covariant risks), insurers charge extra for holding large capital reserves. This adds significantly to the insurance premium. Without government or donor support, private insurance is thus not easily affordable to low-income clients. The market, alone, cannot cover the insurance needs of the poor.

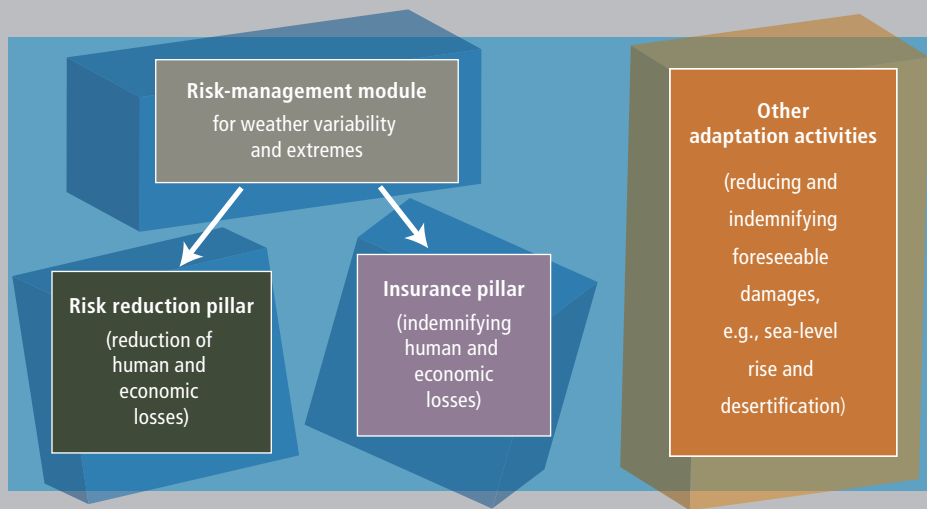
## What is the experience with insurance instruments and programs in developing countries?

Catastrophe insurance is playing an increasingly visible role in developing countries with novel, donor-supported programs demonstrating their potential to pool economic losses and smooth incomes of the poor facing weather variability and climate extremes, as well as transfer risks to the global capital markets. For example:

- In *Malawi*, smallholder farmers can buy affordable, index-based drought insurance. Unlike traditional claims-based insurance, indemnity is based on an index of local rainfall. By making farmers more creditworthy, this pilot loan/insurance scheme enables farmers to purchase hybrid seeds, and thus greatly increase their productivity.
- To insure against insufficient funds for post-disaster relief and infrastructure repair the *Mexican* government has insured its catastrophe reserve fund, including a catastrophe bond, which pays an above-market interest rate if rainfall exceeds a specified level, but part of the principal would go to the *Mexican* government if rainfall is below this level.
- The *Caribbean island states* have recently formed the world's first multi-country and index-based catastrophe insurance pool to provide governments with immediate liquidity in the aftermath of hurricanes or earthquakes.

Participants at an expert workshop on *Insurance Instruments for Adaptation to Climate Risks*, hosted by IIASA in 2007,





**Figure 2**  
The MCII proposed risk-management module, together with other adaptation activities, would help vulnerable countries adapt to climate change.

noted that experience was too short to judge if internationally backed public–private systems were viable in the long term. However, they might radically change the way development organizations provide disaster aid and support adaptation to climate change. Importantly, without exception the schemes have received technical and/or financial support from international development and donor organizations.

## Can climate insurance be designed in a way that contributes to adaptation instead of maladaptation?

Adaptation can be thought of as reducing risks to lives and livelihoods, property and assets. This includes physical interventions (flood defences or early warning systems); lifestyle changes (relocating or changing livelihoods); training for early warning systems; and strategies for recovery (formal and informal insurance). Insurance can be part of a wider adaptation toolkit if it is designed to reduce risk and help vulnerable countries and people adapt to climate change. But insurance without this design element will be less effective.

*Well-designed* insurance reduces disaster losses in two ways: (1) by providing early liquidity, it prevents long-term loss of livelihood and lives; and (2) by pricing risk, it sets strong incentives for pre-disaster preventive behavior. In Istanbul, for example, apartment owners who choose to disaster-proof their properties pay a lower insurance premium, making investments in safety more attractive. Poorly-designed insurance contracts, on the other hand, can discourage investments in loss prevention or even encourage negligent behavior.

## What principles should guide outside support for insurance programs?

There is discussion on how both the public and the private sector could most effectively implement insurance programs that avoid moral hazard and disincentives for reducing risks associated with badly designed insurance instruments. There are some basic principles that could guide support for insurance programs, these include:

Firstly; greatest priority should be on the most vulnerable people and countries. There must be transparent, participatory, and inclusive decision-making at all levels.

Adaptation is the goal, disaster risk reduction and insurance are complimentary components, and therefore, insurance should help manage uncertainty, provide financial smoothing, and at the same time reduce risk. A recent micro-insurance system in Ethiopia provides opportunities for farmers to work on risk-reducing projects in the off season as a way of paying their premiums, thus avoiding the price distortions of direct subsidies.

Support to government risk transfer should also avoid creating disincentives for adaptation and crowding out the private market, for example by targeting extreme event risks, which private markets are reluctant to cover, and coupling support with requirements for risk reduction.

Finally, support must be predictable, reliable and result in regular and adequate flows of finance. Installments should be periodic and be above and beyond existing official development assistance targets.

## What role might insurance instruments play in a climate-adaptation regime?

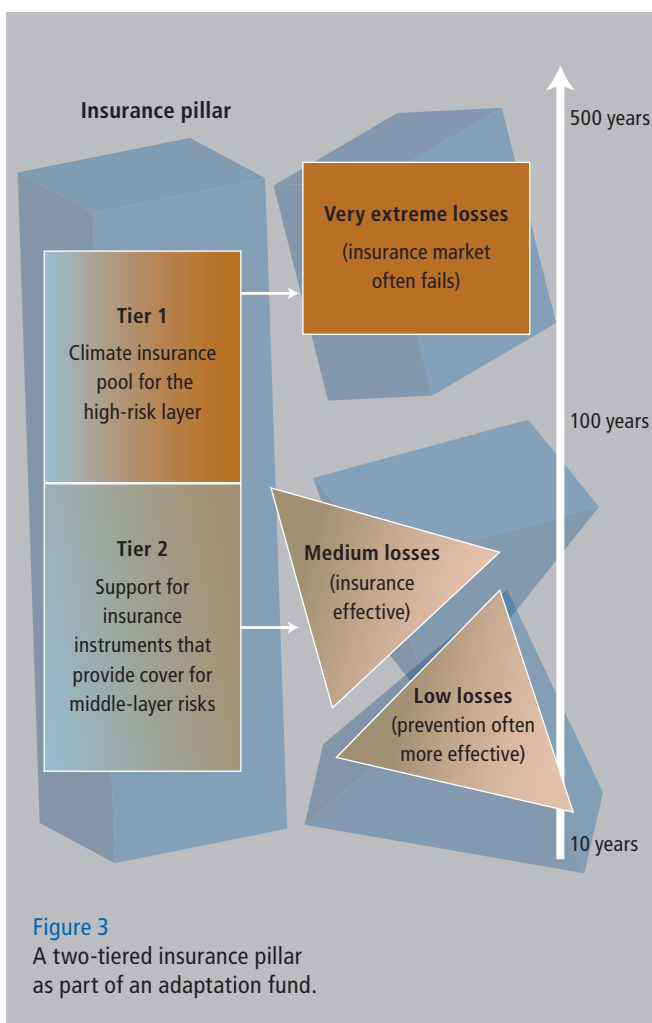
To help define this role, IIASA has worked with the Munich Climate Insurance Initiative (MCII) to put forward a proposal for a risk management module consisting of two pillars, **risk reduction** and **insurance**, which would act together to reduce the human and economic burdens on developing countries (Figure 2). Both pillars would be fully financed by a post-Copenhagen, multilateral adaptation fund.

### The disaster risk reduction pillar

Preventing and reducing human and economic losses from climate-related disasters must be the first priority of a risk-management strategy. The first pillar thus calls for comprehensive risk management across vulnerable countries, building on detailed risk assessments. Risk assessments can uncover unforeseen possibilities for risk reduction, like early warning and land-use restrictions, and help lay the groundwork for risk-transfer systems. Qualification for participation in the insurance pillar might include progress on a credible risk-management strategy, with a specific focus on the most vulnerable communities and sectors.

“Communities value disaster insurance not because it rewards them or makes them richer after a disaster. They value insurance because they see it as an instrument of dignity. Financial support to recover from a disaster becomes their right without sacrificing their self respect. It is far more dignified to claim your right for recovery than to find yourself dependent on the *ad hoc* generosity of donors.”

— Hari Krishna (2007), Expert Workshop on Insurance Instruments for Adaptation to Climate Risks, Laxenburg, Austria



### The insurance pillar

This has two tiers, reflecting the different layers of risk that need to be addressed for effective climate adaptation: “high level,” exceeding the ability of any given country to pay in the case of an extreme event; and “middle level,” where any given country could cope given the proper facilitating framework. “Low level” risk is absent; this can often be dealt with more cost-effectively by prevention measures.

As shown in Figure 3, the first tier would provide insurance cover to vulnerable country governments for a pre-defined high layer of risk (e.g., events expected to occur only every 100 to 500 years), and the premiums would be fully paid from a post-Kyoto adaptation fund. The second tier would enable mainly micro-scale risk-pooling and transfer mechanisms that provide cover for medium-loss events (e.g., events expected to occur every 10 to 100 years).

**Insurance pillar, Tier 1** takes the form of a solidarity fund, or Climate Insurance Pool (CIP), to indemnify developing country property and infrastructure (and, potentially, lives and livelihoods) against low-frequency, high-consequence, climate-related events. The CIP would receive a fixed annual allocation from an adaptation fund equaling the expected average annual costs of the insurance scheme. The CIP operations would be managed by a dedicated professional insurance team responsible for risk pricing, loss evaluation (potentially based on an index), and indemnity payments, as well as placing reinsurance.

**Insurance pillar, Tier 2** would take the form of a Climate Insurance Assistance Facility (CIAF) to provide support for the middle layer of risk and is based on a proposal by Linnerooth-Bayer and Mechler (2006), similar to a recent proposal for a joint International Fund for Agricultural Development—World Food Programme Weather Risk Management Facility, funded by the Bill and Melinda Gates Foundation. It would offer support to nascent micro-, meso-, and macro-scale disaster insurance systems, like those operating in Malawi and the Caribbean.

The MCII proposal emphasizes the complementary role of risk management, reduction, and sharing. The proposal addresses the challenge of providing support to promote sustainable, affordable, and incentive-compatible insurance programs with minimal crowding out of private sector involvement. While the first tier offers premium-free insurance for an upper layer of risk, it can be justified by market failure for this risk layer. By enabling insurance for the poor, this tier opens opportunities for capitalization through risk-transfer programs involving the private market. The second tier imposes affordable prices on heretofore unpriced 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 programs.



Children fetch water during flooding in Sudan, August 2008.  
UN Photo/Tim McKulka



Drought has severely impacted many farmers and crop yields in the west of Nepal in 2008. © Naresh Newar/IRIN

## What is the message to policymakers for a post-2012 strategy?

One clear message for policymakers is that insurance mechanisms have a promising role in an adaptation regime. There are large, potential benefits for insurance in the developing world:

- providing security against the wholesale loss of assets, livelihoods, and even lives in the post-disaster period;
- changing the way development organizations provide disaster assistance and, at the same time, engaging the private sector in vast markets;
- ensuring reliable and dignified post-disaster relief;
- setting powerful incentives for prevention; and not least,
- spurring economic development.

There are also many challenges: assuring sustainability and affordability in light of covariant risks; defining an appropriate role for donors, given the inefficiencies of subsidies; and assuring that systems avoid moral hazard and contribute to “good” investments.

A second message is that options already exist for including insurance mechanisms in the post-2012 adaptation strategy. As a practical way forward, this discussion has laid out a two-pillar international risk-management approach as part of an adaptation regime supported by the international community: a *risk reduction* pillar that would directly support risk-reduction measures and a two-tiered *insurance* pillar that would address high- and medium-layers of risk.

Because of the substantial economies of scale related to pooling public- and private-sector risks, there are strong arguments for creating facilities for sharing risk at the global or regional scales.

By clarifying the opportunities and challenges of insurance as an instrument for adaptation, and outlining a practical way forward, it is hoped that this discussion contributes to the opportunities facing policymakers in adopting a comprehensive post-2012 adaptation strategy that enables risk-management and insurance through the funding of a global adaptation strategy.





A woman in Bangladesh searches her home destroyed by Cyclone Sidr in November 2007. © Tanvir Ahmed/IRIN

## Further information

Linnerooth-Bayer J, Bals C, and Mechler R (2009). Insurance as part of a Climate Adaptation Strategy. In: *Making climate change work for us: European perspectives on adaptation and mitigation strategies*, M. Hulme, H. Neufeldt (eds), Cambridge University Press, Cambridge, UK.

The findings were first presented at the Accra Climate Change Talks in August 2008 and subsequently to the UN Climate Change Conferences COP14 (Poznan, December 2008) and COP15 (Copenhagen, December 2009).

IIASA Policy Briefs present the latest research for policymakers from IIASA—an international, interdisciplinary research institute sponsored by scientific organizations in Africa, the Americas, Asia, and Europe. This briefing is a revision of IIASA Policy Brief #04, published December 2008. The research presented is from IIASA's Risk and Vulnerability Program; Germanwatch, a nongovernmental North–South initiative; and the Munich Climate Insurance Initiative. The views expressed herein are those of the researchers and not necessarily those of IIASA or its research partners.

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For details of the topics covered in this briefing, see:

Bals C, Warner K, Butzengeiger S (2006). Insuring the uninsurable: Design options for a climate change funding mechanism. *Climate Policy* 6(6):637–647, [www.earthscanjournals.com/cp/006/06](http://www.earthscanjournals.com/cp/006/06). Special issue on *Climate change and insurance: Disaster risk financing in developing countries*, E. Gurenko (ed.).

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Linnerooth-Bayer J, Mechler R (2007). Disaster safety nets for developing countries: Beyond public–private partnerships. *Environmental Hazards* 7(1):54–61, doi:10.1016/j.envhaz.2007.04.004. Special issue on *Disaster Risk Management: Pro-active Financing to Reduce Vulnerability*, A. Amendola, J. Linnerooth-Bayer, N. Okada, P. Shi (eds).

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Mechler R, Hochrainer S, Linnerooth-Bayer J (2006). Public sector financial vulnerability to disasters: The IIASA CATSIM Model. In: *Measuring Vulnerability to Natural Hazards: Towards Disaster Resilient Societies*, J. Birkmann (ed.), UNU Press, Tokyo, Japan, pp. 380–398. (See [www.unu.edu/unupress/2006/measuringVulnerability.html](http://www.unu.edu/unupress/2006/measuringVulnerability.html).)

Munich Climate Insurance Initiative (MCII) (2008). "Insurance Instruments for Adapting to Climate Risks: A proposal for the Bali Action Plan, Version 2.0." MCII Submission to the 4th session of the *Ad Hoc Working Group on Long-Term Cooperative Action under the Convention (AWG-LCA 3)*. Poznan 1–13 December, 2008. [www.climate-insurance.org/upload/pdf/MCII\\_submission\\_Poznan.pdf](http://www.climate-insurance.org/upload/pdf/MCII_submission_Poznan.pdf).