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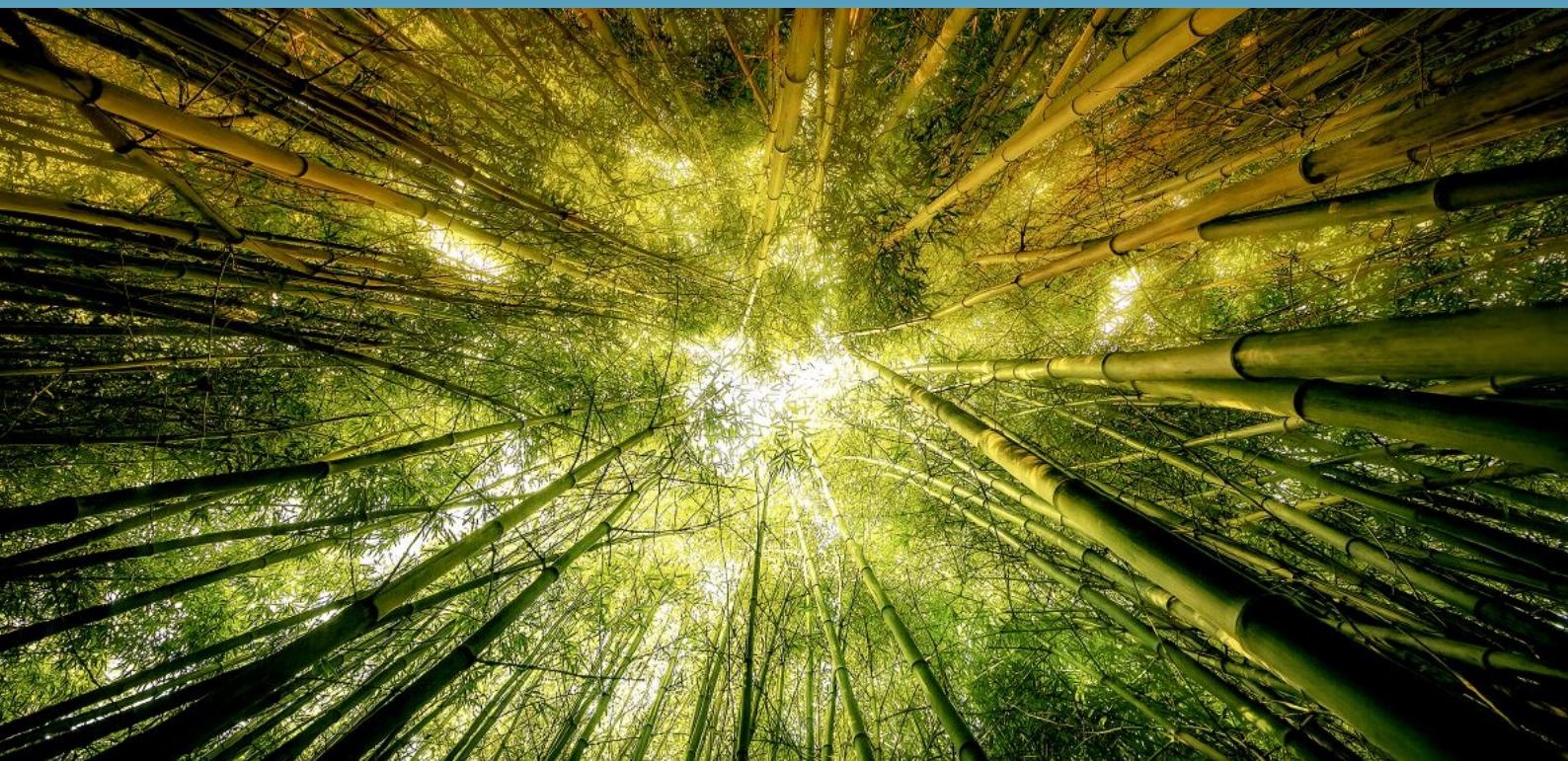


UNEP **Finance Initiative**
Changing finance, financing change

INSURING CLIMATE RESILIENCE

How insurers are responding to climate change.

And how they can be part of an effective government response.



Insights from a UNEP FI global survey of the insurance industry



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INSURING CLIMATE RESILIENCE

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EXECUTIVE SUMMARY

This report draws from the insurance industry's accumulated experience and expertise in risk management and risk transfer to inform the work of the UN Framework Convention on Climate Change (UNFCCC) on how insurance might be used to assist countries that are most vulnerable to loss and damage from climate change. The information is based on a survey of insurance organisations conducted by the UN Environment Programme Finance Initiative (UNEP FI). The respondents represent a wide range of countries, organisations and functional responsibilities.

The insurance industry perceives climate change to be a real challenge that already today is increasing risk to its clients.. The threat is most apparent in property insurance, where it can already be seen in insurance claims data. The effects are expected to spread in the coming years to other major classes of insurance such as life, accident and health insurance, which are also key areas for the public sector.

The insurance industry is already adapting to climate change. Both local and international insurers are actively pursuing improvements in risk management and risk transfer.

Strikingly, insurers see risk control (i.e. physical risk management, including the identification, prevention and reduction of risks) as more effective and beneficial to society than simply transferring risks via insurance from the at-risk party to the insurer. Accordingly, measures such as flood control, land-use regulation, and improved drainage are viewed as high-priority issues.

There will always be some residual risk after a process of risk control, and, in the context of making risk transfer accessible to vulnerable communities, insurers believe the best insurance approach is a public-private collaboration. This combines the government's authority to require certain measures with the innovation of and cost-efficiency of the private sector, which frees up public resources for other priority needs.

Strategically, the best avenues for government intervention to promote the development of insurance markets are **more effective disaster management** and **improving the knowledge base** through better availability, reliability and accessibility of weather data, whereas regulation (including subsidies) is seen as less effective.

A key message is that the effectiveness of all three strategies is highest at the **national level**. This is the level at which key organisational and resource allocation decisions are made in the public and private sectors. The international dimension is also important for the knowledge base, due to the need for international co-operation in collecting, standardising and analysing data, which are relevant to regulation and risk management. Finally, action at the local level is central to risk management since the shape and intensity of different risks will depend on the local characteristics of where they materialise.

Specifically, insurers believe that the key, most effective types of government intervention should occur at different levels:

- **Government interventions at the international level should focus on improving the knowledge base.** These include climate change adaptation research in the context of risk management and insurance; improvements in the availability, reliability and accessibility of weather and climate data; the development of loss models correlating weather data and asset statistics (e.g. human, incomes, property); and the promotion of dialogue on these issues among relevant stakeholders.
- **Government interventions at the local level should focus on improved physical risk and disaster management.** These include improvements in flood prevention and control systems; improvements in drainage systems; improvements in land use, planning and management; improvements in disaster planning and management; and improvements in infrastructure resilience and safety (including enhancement and enforcement of building codes).
- **Government interventions at the national level should focus on the above issues as well as the establishment of integrated risk management approaches and risk transfersolutions,** including partnerships with the insurance industry (i.e. public-private); improvements in zoning (e.g. coastal, wind, flood, land); improvements in management, conservation and restoration of ecosystems; improvements in asset statistics (e.g. human, incomes, property), including asset vulnerability and geographic distribution of asset values; and the promotion of insurance literacy. Furthermore, insurers believe that regulatory interventions in the insurance industry will be most effective if undertaken at the national level.

Given the perceived importance and effectiveness of government intervention at the national level it can be argued that the prime role of the international community (through, for instance, the international regime on climate change) could be to support national governments in developing countries to undertake these actions.

1. INTRODUCTION

Global insurance claims data show a rapid increase in loss and damage from extreme climatic events. When changes in socio-economic factors have been adjusted for, there is still a distinct upward trend, which appears to confirm that the effect of climate change is already present (Swiss Re, 2012; Munich Re, 2013). Most affected by this negative development are low-income communities in developing countries where, in contrast to developed countries, there is insufficient capacity to adapt (IPCC, 2012).

With on-going climate change, vulnerable communities will be even more impacted. Despite past, current, and future efforts to reduce global greenhouse gas emissions, climate change will continue to unfold, intensifying loss and damage due to extreme weather events such as floods, storms, hurricanes and droughts, as well as slow-onset events such as sea level rise, desertification and the disappearance of glaciers (IPCC, 2012).

In this context, the Loss and Damage Work Programme within the UNFCCC process aims to inform a decision on how the international community, through its global regime on climate change, can, should or will support developing countries in particular to cope with loss and damage associated with the meteorological and hydrological implications of climate change. Insurance is one of the possible approaches to be investigated (UNFCCC, website).

The insurance industry has accumulated extensive experience and expertise in risk management¹ and risk transfer² relating to weather events such as storms, floods and droughts. Enhancing physical risk management directly supports the risk transfer benefit afforded by insurance coverage by reducing risk and can bring benefit to all the exposed parties (Santam et al., 2012). It is therefore natural to hear the insurance industry's views on these aspects of adaptation policy.

It is true that, at present, insurance penetration in developing countries, particularly among vulnerable, low-income communities, is insufficient and far less than in OECD- countries (this is precisely one of the key shortcomings that this study addresses) (UNFCCC, 2008). However, the insurance industry is already actively seeking to expand its role in these regions, as this report will show.

This survey report focuses on the possible reduction of vulnerability and how it could be achieved involving the insurance industry. Insurance is an investment in the protection of assets and activities, which can decrease the vulnerability of communities and therefore increase their resilience. This is especially important for developing countries where the losses caused by climate change impacts are expected to be very high. Therefore, mobilising insurers to deliver risk management services and risk transfer products to vulnerable communities is an important challenge.

¹ **Risk management** here is defined as the **ancillary** activities involved in coping with risks. These span risk identification, risk assessment, loss prevention measures, and loss reduction measures.

² **Risk transfer** here is defined as the **core insurance** activities. These span risk underwriting (tailoring insurance terms and conditions for individual situations), product development (designing generalised insurance products), claims management, and reinsurance.

Through a global survey in the fourth quarter of 2011, UNEP FI learned more than 50 insurance organisations around the world are responding to climate change. The key messages are highly relevant today.

Critically, UNEP FI asked what insurance companies need from governments and regulators at the local, national and international levels to make their risk management and risk transfer skills more accessible to vulnerable communities in developing countries.

Within the UNFCCC process, discussion is focusing on exploring a range of approaches and potential mechanisms, including an international facility, to address loss and damage associated with the adverse effects of climate change (UNFCCC, website). This research suggests that using the existing structures and involving the private sector could be an important element in any solution, and could serve as support for a more complex institutional mechanism. Involvement of the private sector could facilitate the implementation of new measures, be more cost-effective, and reduce the demands on public finance.

At the same time, there are other important international public policy processes, frameworks and platforms which are likely to explore i) the role and potential of the insurance industry in building and catalysing resilience and ii) the role of governments and regulators in facilitating that.

These include:

- The post-2015 Framework for Disaster Risk Reduction, which will succeed the “Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters”
- The post-2015 Development Agenda, which will succeed the UN Millennium Development Goals
- The Global Framework for Climate Services
- The 2016 World Humanitarian Summit

The findings of this research can help guide policymakers towards public policies that will mobilise the risk management expertise and resources of the global insurance industry to help meet the challenge of building climate and disaster-resilient communities and economies.

2. RELEVANCE OF CLIMATE CHANGE

The respondents to the survey overwhelmingly believe that climate change is real (see Annex 2). A key factor that supports the awareness and acceptance of a changing climate by actors in the insurance industry is insurance claims data itself. This suggests that the impact of climate change is already evident. Thus, respondents believe climate-related risks are relevant to their companies' **risk management** and **risk transfer** activities.

Participants were asked to score the relevance of climate change, from 0 (not relevant) to 3 (highly relevant). In general, insurers currently regard climate-related risks as low to moderately relevant (see Figure 1, All Lines). They also believe that climate change and related shifts in weather-risk landscapes will gain more importance over the next decade and beyond, reaching a level of moderately relevant across all lines of business. However, for **Property**, climate risks are already at that level, and will move towards high relevance in the coming years (see Figure 1, Property). This concurs with previous studies explaining how the industry has already faced increased losses in this area (Dlugolecki et al., 1995; Vellinga and Mills et al. 2001; The Geneva Association 2009; Dlugolecki et al., 2009; Mills, 2009).

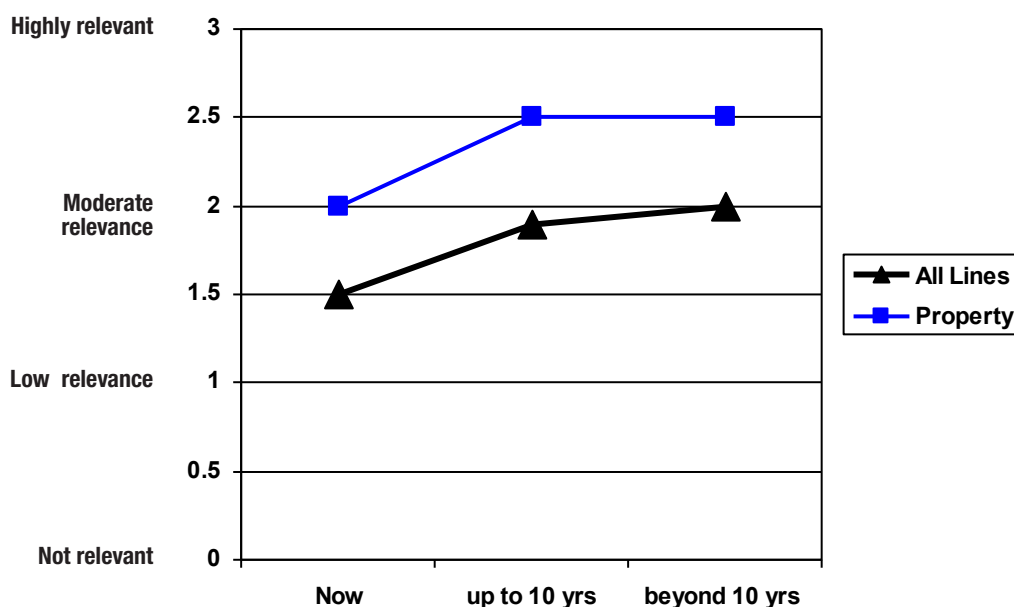


Figure 1

Relevance of climate change to insurers' risk management and transfer activities. Relevance was ranked on a scale of 0 = "no relevance" to 3 = "high relevance".

The trend of increasing relevance of climate-related risks over time is evident across all insurance lines surveyed (see Figure 2). Immediately after Property come other lines of insurance very exposed to weather: Agroforestry; Engineering; and Marine, Aviation, Transport.

Compared to non-life insurance, climate-related risks appear to have low relevance now when it comes to Life and Accident & Health. However, the relevance reaches or approaches “moderate” within the next two decades. These are enormously large classes of insurance, often in the public sector, and often overlooked in terms of climatic stresses since relatively few deaths from extreme events occur in developed countries. The current low relevance value of **Life and Accident & Health** is consistent with previous studies (Mills, 2009; Dlugolecki et al, 2009). However, insurers’ increased future relevance regarding these areas may reflect the fact that leading researchers and scientific bodies have projected that climate change will have significant negative impacts on human health (World Health Organization, 2009).

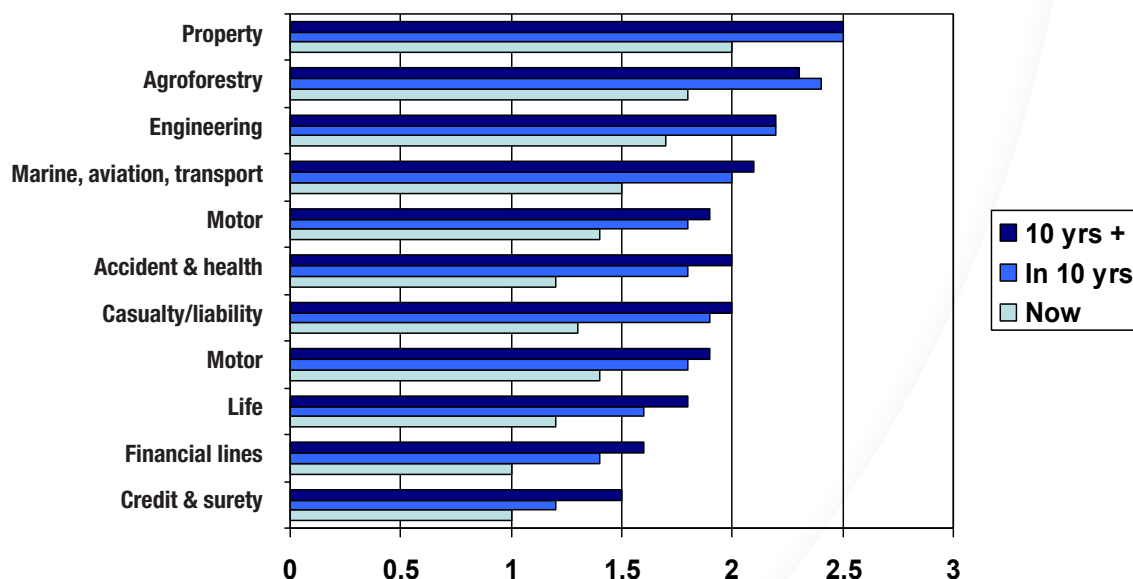


Figure 2

Relevance of climate change to insurers’ risk management and risk transfer activities. Relevance was ranked on a scale of 0 = “no relevance” to 3 = “high relevance”.

3. RESPONDING TO CLIMATE CHANGE

It seems obvious that the increasing relevance of climate change requires attention. Therefore, the participants were asked how their companies are responding to climate-related risks in their core activities.

The survey defined eleven activities related to risk management and risk transfer, as shown on the vertical axis in Figure 3. Respondents were asked what “major changes” they had initiated in those areas in the past 5 years, and similarly, what major changes were anticipated in the next 5 years. The action was concentrated in the 55 respondents whose companies cover Property. In total, they reported 290 major innovations before the survey, and already knew of 323 that would follow in the next 5 years, an increase of 11% in the rate of innovation.

Figure 3 shows that most of the major changes lie in the area of risk management, 363 out of the total 613, or 59%. This reflects the fact that the insurance industry has well-developed risk transfer processes for every class of business, and that these can be readily transferred from developed to developing countries. However, risk management requires a fundamental exercise to engage with other stakeholders, and to gather more detailed information, which can then be converted into a risk-relevant context. This process is well under way in developed countries, but is only embryonic in developing countries.

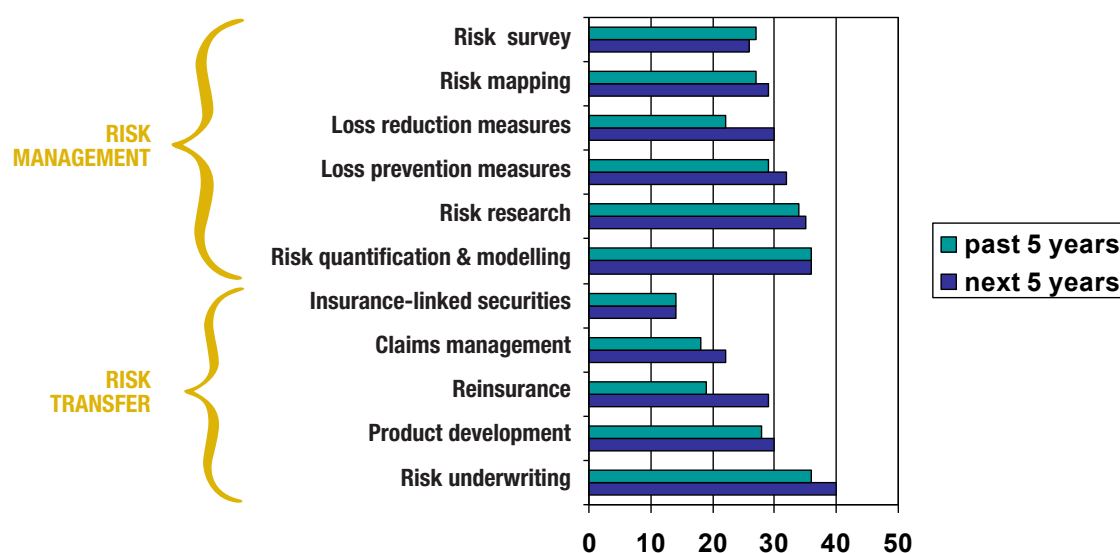


Figure 3

Major changes driven by climate change, for the past 5 years and the next 5 years

Figure 4 shows this clearly. The number of major innovations will **reduce** from 3.3 to 2.1 per insurer in developed countries over the 10-year period covered. Further changes are likely to be incremental in nature, rather than major alterations to procedures and systems. However, the rate of change will **increase** from 4.6 to 6.2 per insurer in developing countries. The incidental comments supplied refer to issues such as improved risk acceptance procedures (through surveys and reports and deeper analysis; better mapping, in particular with grid references and elevation data; and more rigorously designed reinsurance arrangements).

Some insurers also referred to the need to engage with stakeholders for effective risk management (see Section 6, where this aspect is considered in more detail). International insurers are the most active, and will continue to be so. This is due to the fact that they deal with a wider range of territories, and have more resources to commit to research and dialogue with stakeholders. Interestingly, much of their activity is also directed towards developing countries. One respondent referred to a range of major projects in Senegal, Cambodia, Europe, India, and Indonesia, including the use of data collected by satellite.

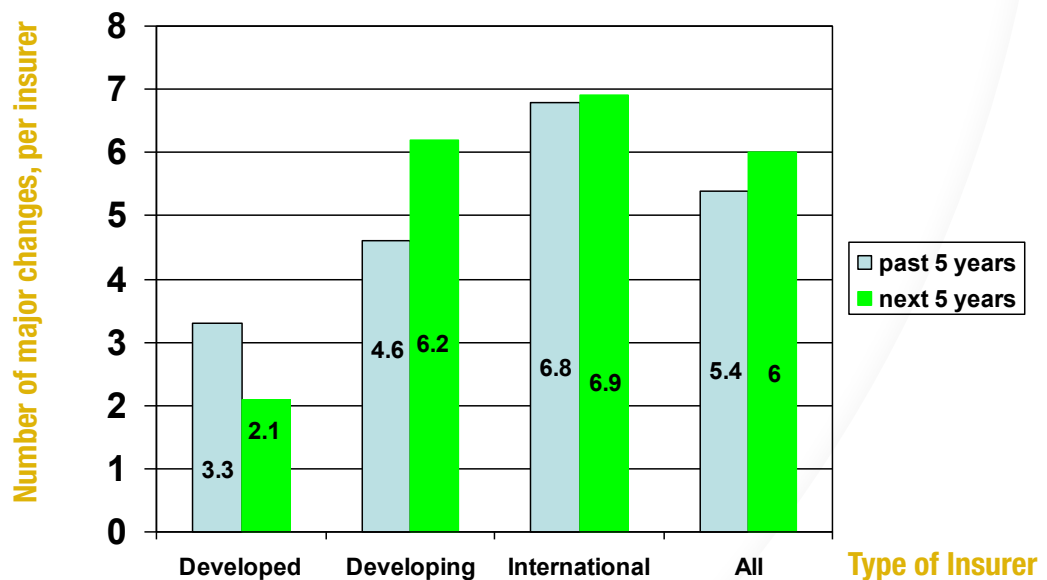


Figure 4

Major changes driven by climate change, per insurer, over the past 5 years and the next 5 years

4. MEASURES TO BUILD CLIMATE RESILIENCE

The classical way to cope with any risk, is first to apply physical risk management, including avoiding the risk if possible, as well as reducing the risk. The residual risk can then be transferred (insured), or retained by the at-risk party (UNEP FI, 2007). This approach applies to climate-related risks in vulnerable communities where physical risk management comprises measures such as the implementation of effective zoning (i.e. prescribing activities and structures in designated locations), restrictions on land use, flood prevention, drainage systems, irrigation systems, resilient infrastructure, and effective disaster management. Beyond reducing the actual risk, these steps help to decrease the risk for insurers, and therefore make insurance more accessible and more affordable to vulnerable communities.

The respondents were asked to rate the cost and benefit for eight risk management solutions (see Figure 5) on a scale from 0 (no cost-effectiveness, or no benefit) to 3 (high cost-effectiveness, or high benefit). The clear leader is flood prevention and control systems, on grounds of both cost-effectiveness and benefit. The related measure of improved drainage also scores well on cost-effectiveness, though not so highly on benefit, since it can only alleviate the flood risk. Land-use control is also seen as highly beneficial, but less cost-effective than flood control. This may reflect the opportunity costs of not developing at-risk land. Zoning, ecosystem management, improved infrastructure, and improved irrigation are all seen as moderately cost effective and moderately beneficial. Perhaps surprisingly, more effective disaster management scores lowest on cost-effectiveness, and joint second-bottom on benefit. This may be because some view that disaster management does not reduce the risk, but is concerned with minimising the impact of a loss that has already happened. There is a clear difference between **disaster risk reduction** and **post-disaster recovery**, and both are necessary for overall disaster risk management.

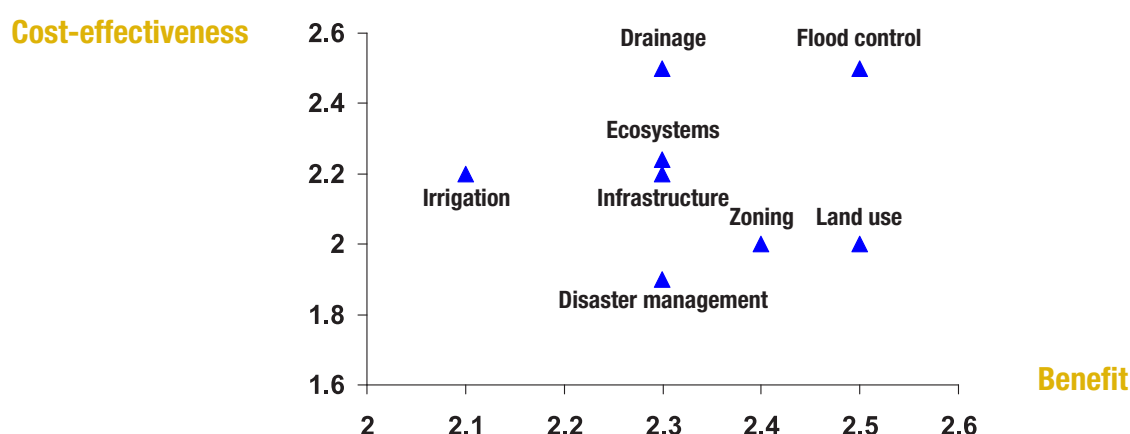


Figure 5

Benefits and costs per risk management solution to building climate resilience in vulnerable communities

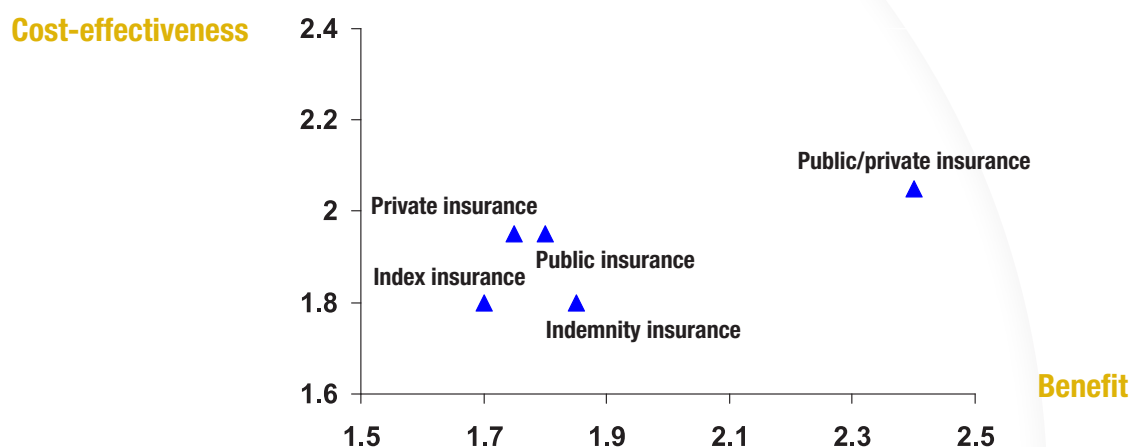


Figure 6

Benefits and costs per risk transfer solution to building climate resilience in vulnerable communities

Figure 6 shows the benefits and costs for different risk transfer solutions, as expressed by the participating insurers. The first point to note is that comparing the risk transfer scores on Figure 6, with the risk management scores on Figure 5, **insurers generally rate risk management significantly above risk transfer, particularly in terms of the benefit to society**. It is better to prevent risks, rather than simply transfer the risks on to another party. In particular investment in risk prevention and reduction activities, for high frequency and low severity climate-related risks, is the most cost effective approach (Warner et al., 2009).

Considering risk transfer solutions alone, in Figure 6, clearly **the optimal solution is a public-private insurance system**, which approaches highly beneficial (a score of 2.4 out of 3), and is also better than moderately cost-effective. It is the only risk-transfer system that matches most of the scores for risk management solutions in Figure 5 (only flood control outscores it). One-dimensional public or private insurance systems are considered less effective, and far less beneficial. The advantages of a public-private insurance system are that it combines the greater resources of the state, which are available to cope with peak catastrophes, and the government's authority to require certain measures, with the innovation and cost-efficiency of the private sector. Also, private sector insurers can play an important role by freeing up public resources for other priority needs. (UNFCCC, 2008)

Comparing index insurance versus indemnity insurance (see Figure 6), the former is seen as less beneficial, probably reflecting the existence of basis risk.

Among the additional comments supplied by respondents, two are worth mentioning. First, microinsurance can be a useful support for microfinance institutions, which are vulnerable to catastrophic events such as typhoons and floods. Second, governments could mandate all organisations involved in providing lifeline services (e.g. water and electricity, to publish their risk management plans to handle specific climate-related risks).

5. THE ROLE OF GOVERNMENTS AT THE LOCAL, NATIONAL AND INTERNATIONAL LEVELS

The previous sections of this report show that climate change is of increasing relevance to insurers, and that insurers are making efforts in improving their capabilities in this important area. But, in practice, there are many obstacles on different levels which hinder the adoption of insurance as part of an integrated approach to managing the adverse effects of extreme weather events. This is especially the case in the most vulnerable communities where increasing exposure is expected, and where there is little protection.

The international climate regime under the aegis of the UNFCCC is examining the question of how to include insurers' knowledge, expertise and products to address loss and damage.

This survey posed this question to insurers: **“How can governments help the insurance industry develop and scale up their products and services in order to build the climate resilience of vulnerable communities?”** and provided them with a “menu” of 18 possible measures.

The respondents were asked to rate these for effectiveness on a scale of 0 = “not effective,” 1 = “slightly effective,” 2 = “moderately effective” to 3 = “highly effective.” The 18 measures fall into three types: three are concerned with regulation, six relate to information, and nine deal with risk management. Figure 7 shows the average effectiveness of the three types of governmental action in building climate resilience for vulnerable communities at the local, national and international levels.

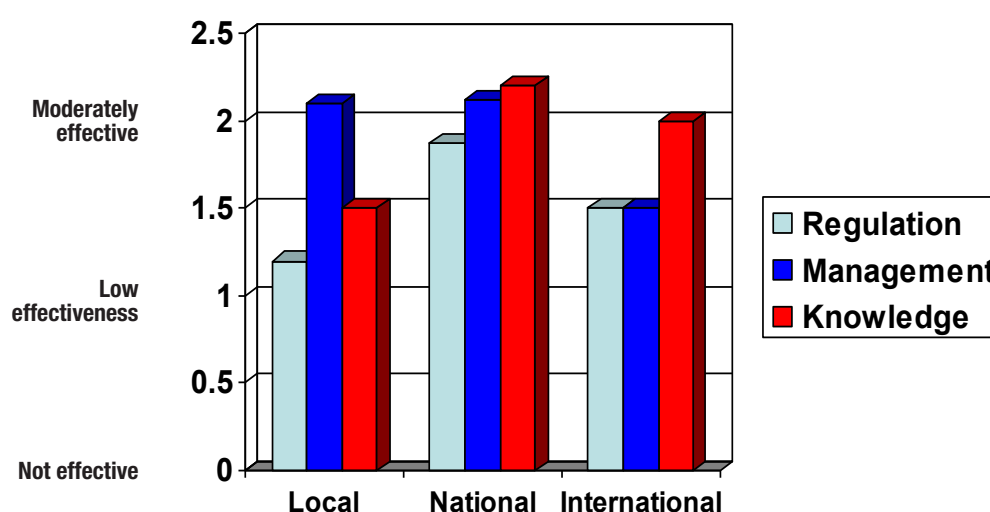


Figure 7

Average effectiveness of governmental actions in building climate resilience for vulnerable communities at the local, national and international levels

A key message is that **the effectiveness of all three types of action is highest at the national level**. No doubt this reflects the point that this is the level at which key organisational and resource allocation decisions are made in the public and private sector. The international dimension is also important for the knowledge base, due to the need for international co-operation in collecting and analysing data, which are relevant to regulation and risk management. Finally, action at the local level is central to risk management since the particular shape and intensity of different risks will depend on the local characteristics of where they materialise.

Figure 8 shows that insurers do not consider any of the three “regulatory” actions (i.e. disclosure of corporate adaptation plans; regulatory support for microinsurance; or premium subsidies for low-income segments) as a major element in developing the insurance market to address loss and damage due to climate change.

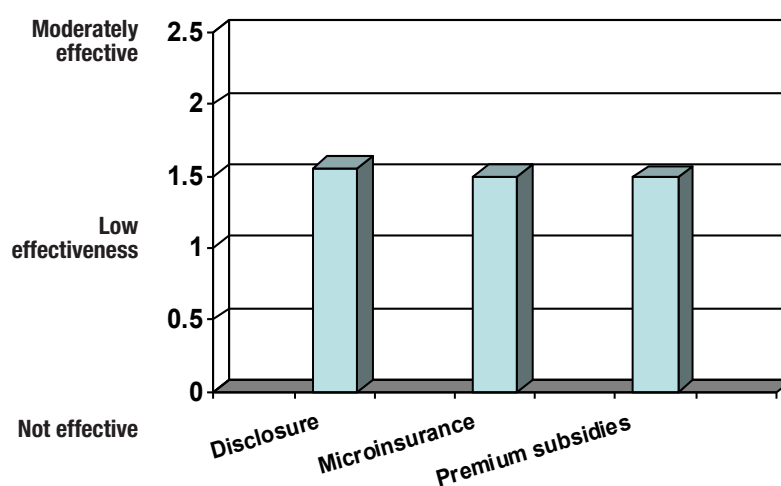


Figure 8

Average effectiveness of governmental actions in the area of regulation

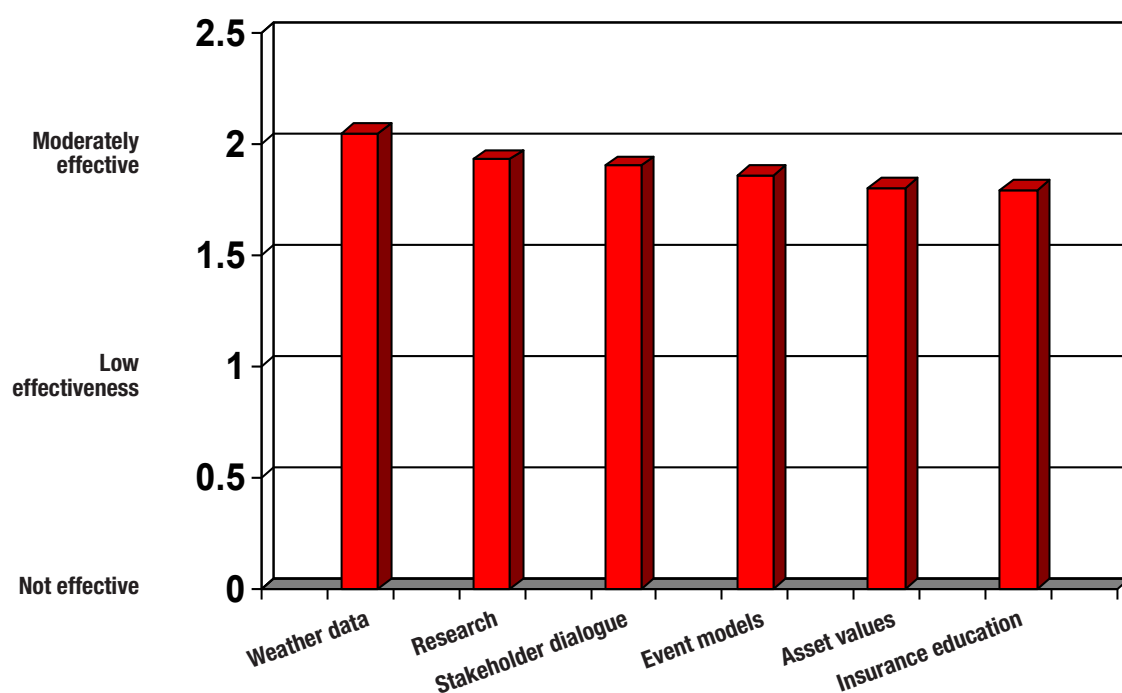


Figure 9

Average effectiveness of different governmental actions in the area of knowledge

Figure 9 indicates that all of the suggested knowledge actions are deemed useful and effective, particularly improvements in the quality, availability and accessibility of weather and climate data.³

The other five (in order of effectiveness: basic research on climate risks; promoting stakeholder dialogue; developing event models; creating databases of at-risk assets; and consumer education about insurance), are all rated higher than any of the regulatory actions.

³ In this context, UNEP FI is actively seeking to advance the quality of climate-related data, see UNEP FI (2011).

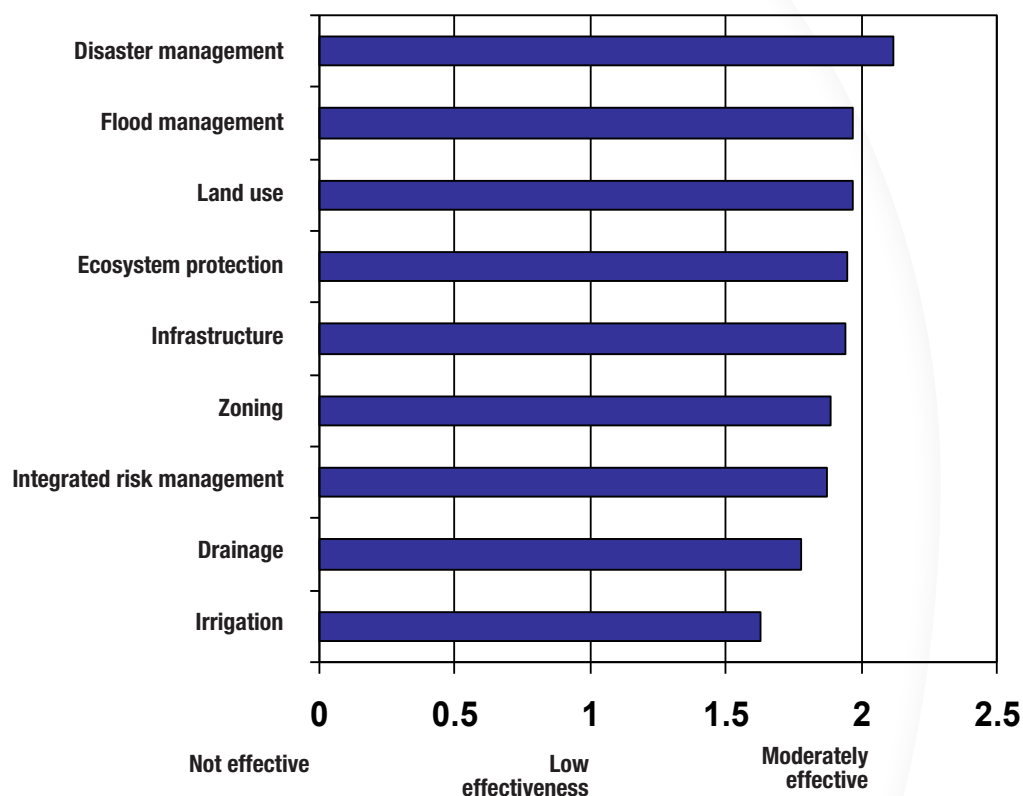


Figure 10

Average effectiveness of different governmental actions in the area of risk management

The responses on governmental action in the area of **risk management** are similar to the previous views on the cost-effectiveness and benefit of risk management (see Figure 10). Insurers rate all of the eight actions as useful. However, more effective disaster management is in this case given the top priority.

The specific actions (in order of effectiveness: improvements in flood prevention and control systems; improvements in land use, planning and management; improvements in ecosystems protection and restoration; improvements in infrastructure safety and resilience (i.e., through building codes); improvements in zoning; establishment of integrated risk management approaches i.e. including risk transfer; improvements in drainage systems; and improved irrigation) are all rated higher than the three regulatory measures.

In terms of specific government interventions, Table 1 displays the measures which insurers consider would be most effective, for different levels of jurisdiction.

LOCAL GOVERNMENT		NATIONAL GOVERNMENT		INTERNATIONAL GOVERNMENT	
INTERVENTION	SCORE	INTERVENTION	SCORE	INTERVENTION	SCORE
Flood control	2.2	Disaster management	2.3	Research	2.2
Drainage	2.2	Weather data	2.3	Weather data	2.1
Land use	2.2	Stakeholder dialogue	2.2	Hazard models	2.0
Disaster management	2.2	Infrastructure	2.2	Stakeholder dialogue	2.0
Infrastructure	2.1	Land use	2.2		
		Flood control	2.2		
		Research	2.2		
		Integrated disaster management	2.1		
		Zoning	2.1		
		Hazard models	2.1		
		Ecosystem protection	2.1		
		Asset data	2.1		
		Risk literacy	2.0		

Table 1

Most effective government interventions at different levels of jurisdiction:
a Score of 2 or above

It is clear that interventions at the national level are considered key, with thirteen policies deemed to be of 'moderate effectiveness or above' (a score of 2 or above out of 3), whereas only five interventions at the local level, and only four interventions at the international level reach the same level of perceived effectiveness.

It is also striking that, with one exception (improved drainage), the local and international policies are also required at the national level. That underlines the pivotal importance of the national level; policies which are necessary at the local or international level are unlikely to be fully effective without the involvement of governments and policy-makers at the national level.

The key public interventions to help the insurance industry develop and scale up their products and services in order to build the climate resilience of vulnerable communities are:

- **Locally:** improvements in flood prevention and control systems; improvements in drainage systems; improvements in land use, planning and management; improvements in disaster planning and management; and improvements in infrastructure resilience and safety (including enhancement and enforcement of building codes).
- **Internationally:** climate change adaptation research in the context of risk management and insurance; improvements in the availability, reliability and accessibility of weather and climate data; the development of loss models correlating weather data and asset statistics (e.g. human, incomes, property); and the promotion of stakeholder dialogue on these issues.
- **Nationally:** the above measures, plus the establishment of integrated risk management approaches and risk transfer solutions, including partnerships with the insurance industry (i.e. public-private); improvements in zoning (e.g. coastal, wind, flood, land); improvements in management, conservation and restoration of ecosystems; improvements in asset statistics (e.g. human, incomes, property), including asset vulnerability and geographic distribution of asset values; and the promotion of insurance literacy.

Given the perceived importance and effectiveness of government intervention at the **national** level it can be argued that the prime role of the **international community** (through, for instance, the international regime on climate change) could be to support **national governments** in developing countries to undertake these actions (in addition to the elements mentioned in Table 1).

These findings mirror the view of a previous UNFCCC Technical Paper on financial mechanisms to manage climatic risks: “National adaptation plans could provide the basis for public–private partnerships to manage the economic costs of climatic impacts through insurance. Key areas for public finance include funding for public goods such as risk-relevant data (e.g. weather maps) and major hazard reduction projects (e.g. flood control). Feasibility studies including demonstration or pilot insurance schemes could also be funded.” (UNFCCC, 2008)

6. STAKEHOLDER INTERACTIONS

Performing risk management and risk transfer is complex. Insurance companies were asked to outline their interactions with market participants and stakeholders. Figures 11 and 12 illustrate the scope of this engagement, as revealed by the survey.

Number of types of stakeholder engaged on average, per respondent

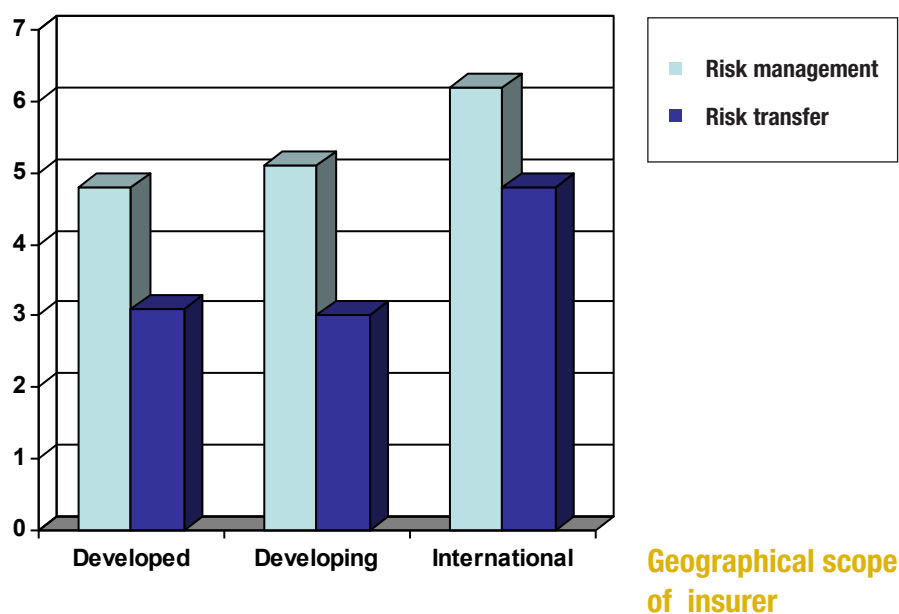


Figure 11

Engagement between survey participants and stakeholders in risk management and risk transfer activities relative to climate change

As might be expected, Figure 11 shows that international insurers are involved with the largest range of stakeholders, because of the number of jurisdictions and the variety of market systems they encounter. Developing country insurers are second, reflecting the exploratory nature of their markets. Developed country insurers are less diverse in their exchanges, because in those markets, institutions like insurance industry associations are generally well established and can collectively carry out some of the functions, such as discussions with the government and regulator.

In all three cases, there are more interactions concerned with risk management than with insurance. This is due to the complex nature of the information required to assess climatic risks, relating to the weather, the land, and the assets and activities at risk, and the fact that such information is not yet well documented.

Figure 12 shows that for risk transfer the key parties are reinsurers, insurers, insurance and reinsurance intermediaries, and service providers (mainly catastrophe modelling firms). In the case of risk management, the interactions are overall more numerous and more diverse. More guidance from different actors is needed and more information gaps exist.

Type of stakeholder

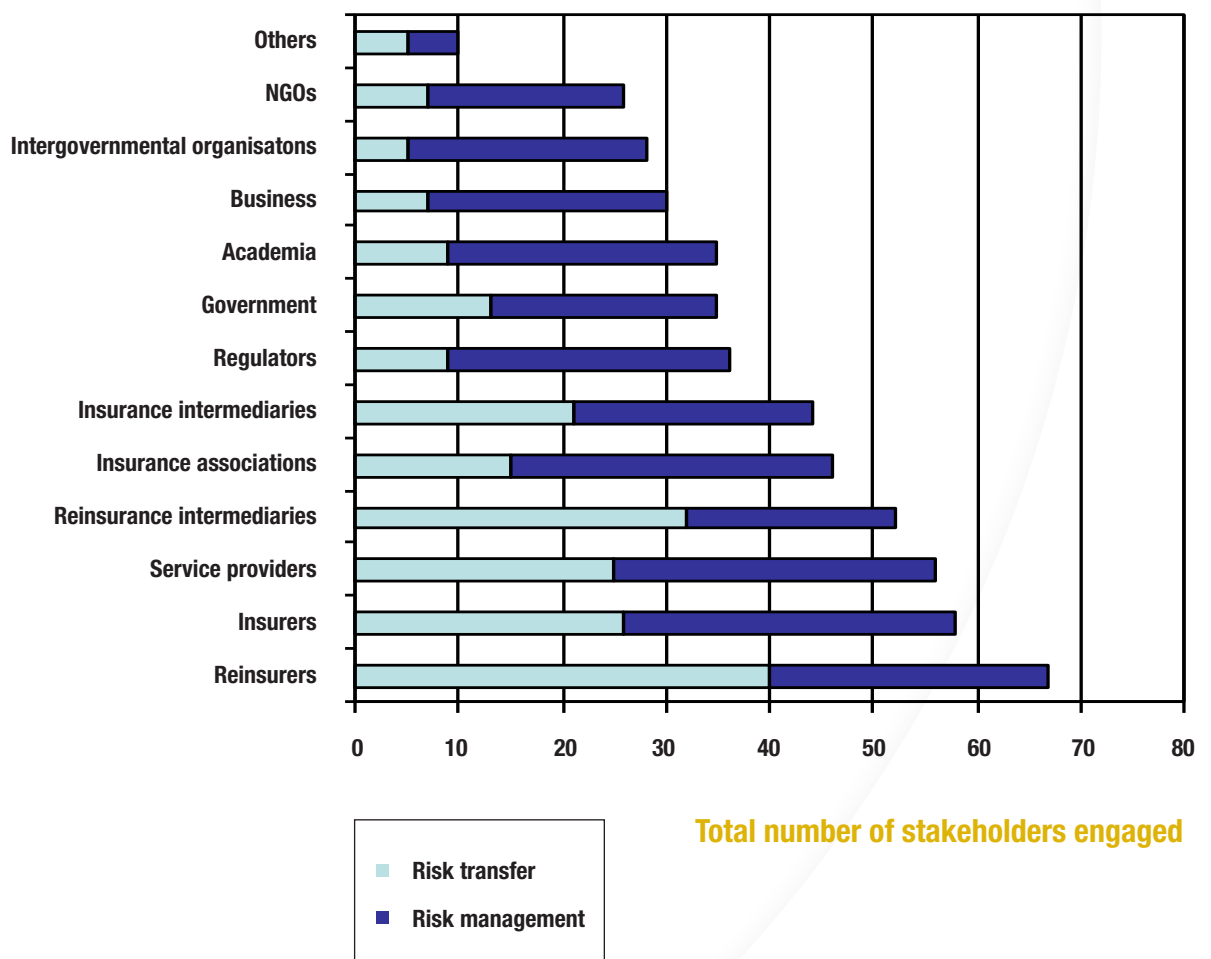


Figure 12

Engagement between market participants and stakeholders in risk management and risk transfer activities

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Annex I

SURVEY QUESTIONNAIRE

- Q1. A. Overall, is your company convinced that climate change is happening?**
- B. Which factors do you think influenced your company to believe that climate change is happening or not happening?**
- Q2. A. How relevant are climate-related risks to your company's risk management and risk transfer/insurance activities?**
- Examples of (physical) risk management activities: risk identification, risk assessment, loss prevention measures, loss reduction measures
 - Examples of (financial) risk transfer/insurance activities: risk underwriting, claims management, product development

Please rate by line of insurance and over time (now, within 10 years, beyond 10 years)

RELEVANCE	SCALE
No relevance	0
Low relevance	1
Moderate relevance	2
High relevance	3
Line of insurance not applicable to my company	N/A

- Q3. A. How is your company responding to climate-related risks?**
- B. In the past 5 years, in which activities did your company carry out major changes? Please specify such changes where applicable.**
- C. In the next 5 years, in which activities do you expect your company to carry out major changes? Please specify such changes where applicable.**

Please use the following categories:

Risk management

- Risk identification (risk research, risk mapping)
- Risk assessment (risk survey, risk quantification and modelling)
- Loss prevention measures (to prevent a loss from occurring)
- Loss reduction measures (to reduce a loss if it occurs)

Risk transfer

- Risk underwriting (e.g. guidelines, pricing, coverage, limits, warranties, exclusions, other policy terms and conditions)
- Claims management
- Product development
- Traditional reinsurance and retrocession
- Insurance-linked securities (e.g. issuance of catastrophe bonds which transfer peak risks to the capital markets)

- Q4. A. What types of risk transfer/insurance products is your company providing for climate-related risks?**
- Traditional indemnity-based insurance (where loss assessment is based on actual loss incurred)
 - Index-based insurance (where loss assessment is based on an index, such as amount of rainfall or wind speed)
- Q5. A. Is your company using insurance-linked securities as an alternative way to diversify peak climate-related exposures (e.g. issuance of catastrophe bonds which transfer peak risks to the capital markets)?**
- B. If yes, do you expect your company to increasingly use insurance-linked securities as an alternative to traditional reinsurance and retrocession?**
- Q6. A. Which insurance market participants and stakeholders is your company engaging with in delivering climate-related risk management and risk transfer/insurance products and services to clients?**
- Insurers
 - Reinsurers
 - Insurance agents and brokers
 - Other risk management and insurance service providers (e.g. loss adjusters, catastrophe model vendors, risk surveyors, consultants)
 - Insurance and reinsurance associations
 - Insurance regulators
 - Governments
 - Intergovernmental organisations (e.g. United Nations agencies)
 - Business and industry
 - Civil society organisations (non-governmental organisations), Academia and scientific community
 - Others (please specify)
- Q7. A. Which types of government and/or insurance industry solutions are cost-effective and beneficial in building the climate resilience of vulnerable communities?**
- Note:** The United Nations International Strategy for Disaster Reduction defines vulnerability as «the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.» Vulnerability has many aspects arising from various physical, social, economic, and environmental factors. In the context of this survey, vulnerable communities are those exposed to the adverse effects of climate change that do not have ready access to available risk management measures, including insurance, and therefore susceptible to climate-related risks.
- Risk management solution**
- Effective management, conservation and restoration of ecosystems (e.g. forests, mangroves, coral reefs, watersheds), also known as “ecosystem-based adaptation”
 - Effective zoning (e.g. wind, flood, coastal, land)
 - Effective land use, planning and management
 - Effective flood prevention and control systems
 - Effective drainage systems
 - Effective irrigation systems
 - Safe and resilient infrastructure (including enhancement and enforcement of building codes)
 - Effective disaster planning and management
 - Other (please specify)

Risk transfer/insurance solution

- Index-based weather insurance for low-income people, where loss assessment is based on an index (e.g. amount of rainfall or wind speed)
- Indemnity-based weather insurance for low-income people, where loss assessment is based on actual loss incurred
- Climate risk insurance facility (national, regional or international level) supported by governments only
- Climate risk insurance facility (national, regional or international level) supported by both governments and the private insurance industry (i.e. public-private)
- Other (please specify)

COST-EFFECTIVENESS	SCALE	BUILDING CLIMATE RESILIENCE OF VULNERABLE COMMUNITIES	SCALE
Low cost	1	Not beneficial	0
Moderate cost	2	Slightly beneficial	1
High cost	3	Moderately beneficial	2
		Highly beneficial	3

- Q8.**
- A. How can governments help the insurance industry develop and scale up their risk management and risk transfer/insurance products and services in order to build the climate resilience of vulnerable communities?**
- B. Please rate the effectiveness of government actions at the subnational, national and international levels.**

EFFECTIVENESS	SCALE
Not effective	0
Slightly effective	1
Moderately effective	2
Highly effective	3

Government actions

- Improve management, conservation and restoration of ecosystems (e.g. forests, mangroves, coral reefs, watersheds), also known as «ecosystem-based adaptation»
- Improve zoning (e.g. wind, flood, coastal, land)
- Improve land use, planning and management
- Improve flood prevention and control systems
- Improve drainage systems
- Improve irrigation systems
- Improve infrastructure safety and resiliency (including enhancement and enforcement of building codes)
- Improve disaster planning and management
- Improve availability, reliability and accessibility of weather data to enhance risk management and risk transfer/insurance products and services, as well as investment activities, of insurance companies
- Improve asset statistics (e.g. human, incomes, property), including asset vulnerability and geographic distribution of asset values
- Fund the development of loss models correlating weather data and asset statistics (e.g. human, incomes, property)
- Conduct climate change adaptation research in the context of risk management and insurance
- Establish integrated risk management approaches and risk transfer solutions, including partnerships with the insurance industry (i.e. public-private)
- Establish long-term dialogue and collaboration with the insurance industry on the development and implementation of climate policy
- Provide subsidies to low-income people to help them buy insurance
- Promote insurance literacy and education to low-income people
- Establish prudential regulations on insurance for low-income people (including availability, affordability and access)
- Establish prudential regulations requiring companies across all industry sectors (including the insurance industry) to assess and disclose their climate-related risks and/or a wider range of environmental, social and governance risks
- Other (please specify)

Annex 2

PROFILE OF RESPONDENTS

Geography and function

The UNEP FI survey had 67 respondents from 55 insurance organisations. Nearly half of the respondents (32 of 67) come from developing countries. Looking at their territorial responsibility (Figure 1), 44% of respondents have responsibility within developing countries, 19% within developed countries, and 37% have an international scope.

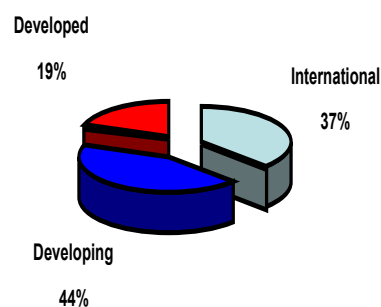


Figure A1

Territorial responsibility of survey respondents

As shown in Figure A2 below, more than half of the respondents have underwriting and risk management responsibilities. CEOs and marketing (including product development) officers are also well represented. The wide range of functional responsibilities gives a holistic picture of insurance practitioner views and expectations.

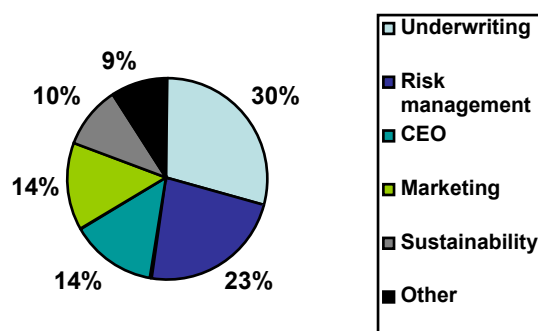


Figure A2

Functional responsibility of survey participants

Knowledge of climate change

The UNEP FI survey had 67 respondents from 55 insurance organisations. Nearly half of the respondents (32 of 67) come from developing countries. Looking at their territorial responsibility (Figure 1), 44% of respondents have responsibility within developing countries, 19% within developed countries, and 37% have an international scope.⁴

When asked about the factors influencing their belief in climate change, climate data (54 of 67 respondents or 81%) and scientific reports (53 respondents or 79%) are the two most important factors (see Figure 3). It is also important to note the influence stemming directly from insurance claims data (38 respondents or 57%). Every respondent mentioned at least one of those three sources. Also notable are the influence of insurance industry initiatives (30 respondents or 45%) and the media (27 respondents or 40%).

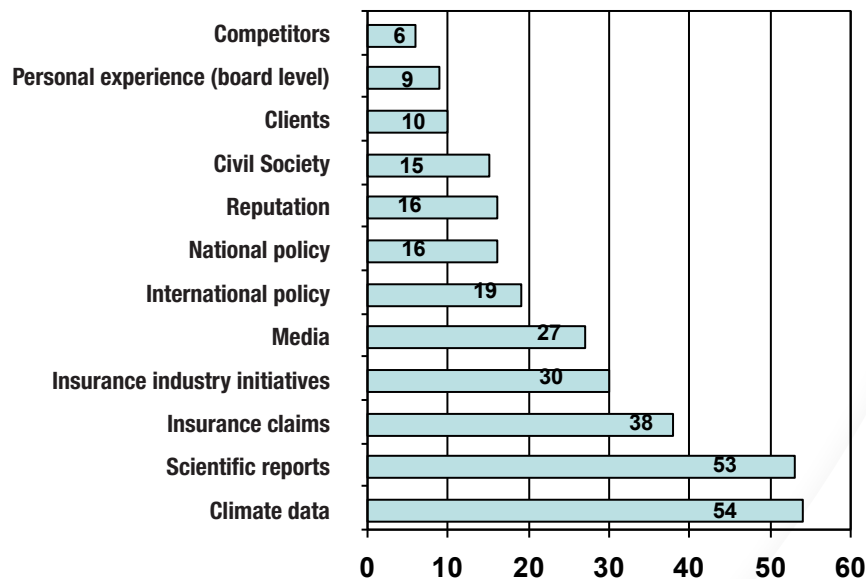


Figure A3

Influential factors for belief in climate change

⁴ This is consistent with other surveys of the insurance industry (e.g. UNEP FI 2009; also a survey of UK actuaries and a global survey of chartered insurers - see Dlugolecki et al, 2009 Chapter 2)

Annex 3

PROFILE OF INSURANCE PRODUCTS

Payout formulation

One issue that has been raised in discussions on how to broaden the use of risk transfer to cope with climate change is the basic formulation of the insurance product. Traditionally, non-life products are indemnity-based (i.e. the payout is primarily determined by the actual financial/monetary loss suffered by the client, duly modified by the actual terms of the insurance contract).

An alternative formulation is “index-based” (also known as parametric insurance). Index-based insurance will issue a payment if some physical threshold is triggered. For example, precipitation can be such an indicator, and a payout will automatically be issued if there is too little or too much rainfall for a given area, regardless of the actual damage. Index insurance has certain advantages: it removes the need to verify the loss, since payouts are determined by an objective factual observation. This speeds up the claims process and reduces administrative costs. Also, since the payout is not directly related to individual circumstances, it reduces the problem of only attracting high-risk clients (adverse selection), and the related problem of less attention being paid to risk management by clients (moral hazard). Finally, index insurance products may be simpler to communicate than conventional insurance products. The major disadvantage of index insurance is that the payout is **not** directly correlated with the individual client’s loss. This is known as “basis risk,” and it can mean that individuals either receive much more or much less than the actual damages they incur. A review of the Caribbean Catastrophe Risk Insurance Facility, which uses index insurance, found that basis risk was a problem (Dlugolecki, Mechler and Kalra, 2013). A second, practical issue is that index products require reliable historical and current climatic information for insurers to calculate the index threshold(s) and to determine when payouts are due.

As Figure A4 shows, relatively few insurers provide index-based products. They are mostly to be found in Property, as an alternative to reinsurance, and also in Agroforestry, where they are used to provide cover for low-income farmers. Figures for the volume of sales of each type are not available, but there is no doubt that only a tiny proportion of insurance is transacted on index-based products, and in Agroforestry, the average premium is likely to be very small. Even in the reinsurance market, where index products have been available for a considerable time as an alternative to traditional reinsurance, the overwhelming proportion of cover is under indemnity contracts, even for catastrophe bonds (Swiss Re, 2012b).

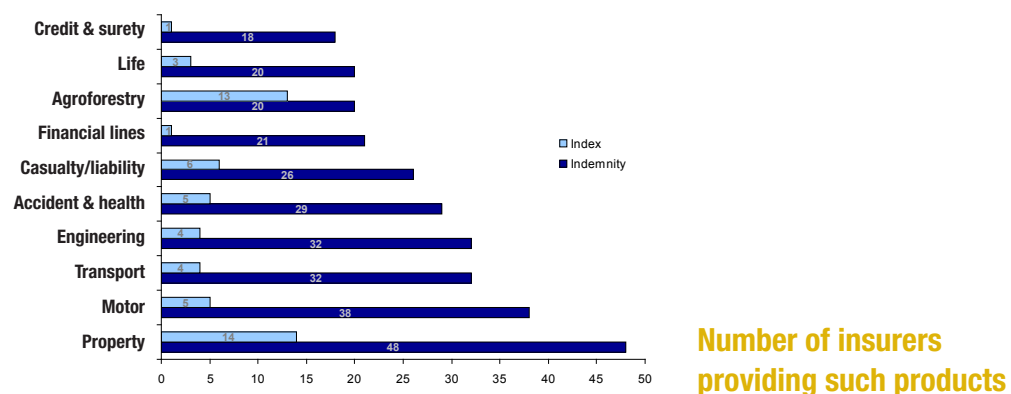


Figure A4

Product formulation for climate-related risks in different lines of insurance

Transferring risks to the capital markets

Insurance companies, and particularly reinsurers, face a huge payout if a major catastrophe occurs. An alternative way to diversify peak climate-related exposures and to alleviate some of this risk is with insurance-linked securities, of which catastrophe bonds (cat bonds) are a prominent example. The essential difference is that the capital for such products is provided on a relatively short-term basis (e.g. for a specific risk transfer contract against a specific storm risk, rather than investors committing their capital unreservedly directly to a reinsurer or insurer). At the end of the contract period, the capital is returned to the investor, and during the contract an above-market rate of interest is also paid to the investor. However, if the bond is “triggered” (i.e. the event which it is insured against, such as a storm or flood, actually happens), then the investor may lose some or all of the interest and capital, which is used to pay claims.

This technique transfers peak risks to investors in the capital markets, such as pension funds, sovereign wealth funds, and high-net worth individuals. For such investors, cat bonds can be attractive because they provide a relatively high interest rate and their return is largely uncorrelated to financial markets. Therefore, they help achieve a better diversification of portfolio risk, and currently returns on conventional classes of assets, such as government bonds, are historically very low.

Figure A5 shows the current use of insurance-linked securities among the participating companies. 19 % are presently using this instrument to transfer part of their risks to the financial markets, and another 6% intend to explore this avenue for risk capital in future. However, 75% of insurers do not plan to use such products—the users tend to be either international companies, or developing country companies involved with reinsurance.

Nonetheless, index-linked securities could play a key role in transferring and hedging climate related risks and help diversify the risk landscape, which they are already doing so.

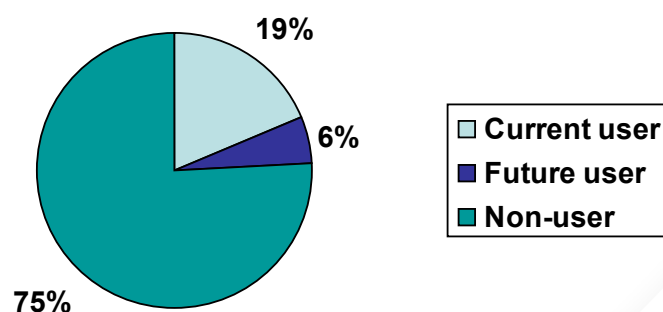


Figure A5

Use of insurance-linked securities



About the UNEP Finance Initiative

UNEP FI is a partnership between the United Nations Environment Programme (UNEP)—the UN system's designated entity for addressing environmental issues at the global and regional levels—and the global financial sector. Through UNEP FI, UNEP works with over 200 banks, insurers and investors to better understand the impacts of environmental, social and governance issues on financial performance and sustainable development. www.unepfi.org

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