

detect changes, benchmark models and validate strategies. Many summit-attending institutions were universities, where knowledge development is a core business, and who are well positioned to be at the forefront of ocean science.

The inaugural Global Ocean Summit facilitated a dialogue between institutions across the world. At the summit the Qingdao Consensus¹⁸ was adopted by acclamation, calling for an accelerated and improved development of ocean science and observing technologies, and fast and widespread dissemination of ocean information and scientific knowledge and increased partnerships in capacity building in developing maritime nations. The regular convening of such a summit holds potential for improved cross-institutional coordination of global ocean issues and, in doing so, realizing the vision of the inaugural summit — to build an ocean of

peace, cooperation and harmony to bring prosperity for generations to come. □

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COMMENTARY:

Responding to adaptation emergencies

Jim W. Hall, Frans Berkhout and Rowan Douglas

The impacts of extreme events are triggering action and reaction — sometimes in unexpected ways. Confronted by ‘adaptation emergencies’, the private sector is rapidly innovating climate risk management, but governments must also fulfil their responsibilities.

Recent extreme weather events have demonstrated the vulnerability of people, infrastructure and economies in many parts of the world: droughts and bushfires in the USA, Russia and Australia; floods in Kashmir, Thailand and the UK; Superstorm Sandy and Hurricane Haiyan; landslides in Japan and China. These events have claimed many lives and generated catastrophic economic losses with global impacts, including systemic disruption to supply chains and hikes in the prices of products from grain to computer chips¹. Unexpected weather extremes have exposed the fragility of many social and economic systems and the frailty of adaptation responses at local, regional and global levels. Governments have been taken by surprise. These events have also shown that climate change is deeply unfair in its impacts,

which brings into sharp relief the winners and the losers, globally and regionally. This generates a new class of governance problems for governments, businesses and international organizations.

We call these large-scale crises that emerge as a result of insufficient capacity to cope with changing patterns of climate-related risks ‘adaptation emergencies’. These may be expressed at a local and regional level, or at a global level, where multiple connected extreme events and impacts generate global-scale emergencies.

The private sector is responding

Confronted by the scale of damage, business interruption, price volatility and dented investor confidence, the private sector is responding. Over the past two decades, assessment of natural catastrophe risk

by insurers has transformed from being based on historical records of losses to model-based risk assessment, employing large multi-disciplinary analytical teams and managing massive datasets on major IT platforms. Specialist catastrophe-risk modelling firms have emerged as part of this new information ecosystem, supplying risk information to the insurance and finance sectors.

Quantified risk assessment and regulatory requirements are now co-evolving. Advanced valuation techniques are providing the basis for new capital requirements and reporting standards. The Solvency II regulations in the European Union have established the convention of a 1:200 level of confidence. This means that an insurance company should have access to sufficient capital (either directly or through

reinsurance) to remain solvent and pay all valid insurance claims when it experiences the worst combination of extreme events affecting its portfolio of insured risk with a likelihood of once every 200 years, over a 12 month period. Changing risk management practices have greatly stabilized the insurance industry's exposure to catastrophic losses, with reduced bankruptcies since the 1990s. The losses insured by private companies (US\$18.8 billion of the US\$70 billion total losses) from Superstorm Sandy were managed well within normal market operations.

The '1:100 year initiative'², launched at the United Nations Climate Summit in New York in September 2014, is seeking to extend stress testing and reporting of natural disaster risk to the rest of the financial sector, including large companies, banks and investment houses. A global requirement, enforced by financial regulators, for quantified risk assessment would cascade in due course, via bond markets and credit ratings, to the public sector, at the city, national or even regional levels. The initiative seeks to focus businesses and investors on catastrophic, systemic and climatic risks. It underlines the increasing visibility of resilience, which is now seen as an aspect of global competitiveness³. Cities like New York, Rotterdam and Singapore already compete on the basis of their resilience to climate risks.

Evolving information ecosystems

Delivering ubiquitous risk assessment and reporting will require a lot more scientific analysis and innovation in practice, as the risks posed to many major assets are not well understood. A recent report by the UK's independent Committee on Climate Change⁴ indicated that critical infrastructure risk assessments are only in place for the electricity transmission and distribution sectors — in all other infrastructure sectors risk assessments are only "partial". Nonetheless, the existence of consistently and transparently reported risk information could be transformative, extending well beyond insurance and finance, to inform climate-proofing investments, business continuity planning and diversification of global supply chains.

The private sector — and it seems some cities also — are often able to move faster in responding to risk and building resilience than central governments. Pressures for deficit reduction in central governments — leading to downsizing and deskilling — are actually reducing capacity. Meanwhile, the widening scope of quantified risk assessment and reporting in the private sector has been accompanied by huge

investments in datasets, analytical staff and computational capacity.

The role of the private sector, not just in self-interested risk reduction, but in reshaping awareness and incentives to adapt, was hardly predicted by adaptation theorists⁵. Theorists have tended to focus on the roles of communities and governments⁶. The theory of 'policy windows'⁷ suggests that crises contribute to the opening of opportunities for policy innovation and reform. In fact, we have seen adaptation emergencies like the floods in the UK actually narrowing the scope, in space and time, of policy debate, threatening well-established and evidence-based policies⁸. The cool-headed rationality of the market may be more far-sighted than politicians who are obsessed with crisis management and the political cycle, especially where capital, like pension funds, is incentivized to look to the longer term.

Balancing public and private interests

Yet, theory and practice also tell us that adaptation cannot be left entirely to the invisible hand of the market⁹. Some businesses will be willing to pay for proprietary risk information that is tailored to their needs, but many societal actors are making decisions that are influencing their vulnerability to climate risks without access to the information they need to inform their choices. In many cases, this may be leading to maladaptation and growing vulnerability¹⁰. Governments have a role in funding publicly-available information and advice, through data acquisition, scientific research and dissemination¹¹. Some of the steps taken by the private sector to report on risks, although 'voluntary', have been encouraged by governments, central banks and credit ratings agencies¹². Public policy can create incentives to adapt (for example through water pricing) and avoid maladaptation. Regulations, like land-use zoning and building codes, are essential instruments in ensuring timely and proportionate adaptation. Governments also have a role in planning and ensuring the resilience of national infrastructures. In an emergency, people turn to government — the same is true for adaptation emergencies. But although government may play an important role in building adaptive capacity in society and business, it cannot alone deal with adaptation emergencies.

Just as in many other areas of risk management, there is likely to be a balance of roles for the private sector and for the government. In relation to extreme events, there are presently a number of evident shortcomings. The first is

scientific: we do not know enough about the changing patterns of losses (whether these are insured or uninsured, tangible or intangible). The second is related to awareness: many business sectors and sectors of government are not climate-risk-aware and have not yet begun to mainstream climate risks into their plans and actions. The third is related to capability: the analytical and the governance capability to move beyond the reactive posture currently being taken is fragile and one of the contributory factors in adaptation emergencies.

The risk professionals in the insurance sector have stepped up to the challenge of adaptation emergencies, with innovation in analytics and business models, and the development of new norms for risk management. Much of that innovation has been enabled by public sector funding of science. In general, governments themselves have not pursued the management of catastrophic and systemic risks with anything like the same vigour, nationally or at the international level. If they had, the political argument for action to mitigate climate risks would be stronger. The challenge now is to universalize transparency about climate risks across all sectors of the economy and in all arenas of public policy. Such a shift would transform awareness and the incentives to act in markets and in government, protecting lives and property, and precipitating a different political debate about the need to protect the global climate. □

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