

# Climate Change: The role of AI in assessing Natural Catastrophe risk

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Juniper Place recently interviewed experts from the insurance space, regarding the impact of climate change on natural catastrophe events.

Growing demand to account for climate change has resulted in innovative, tech-driven solutions in natural catastrophe (NatCat) modelling. These advances allow the insurance industry to better quantify evolving risk and in doing so, generate enhanced financial and social returns within insurance-linked securities (ILS) and catastrophe bond products.

# Climate Change: The role of AI in assessing Natural Catastrophe risk



The role that climate change plays in the frequency and scale of natural catastrophe and extreme weather events is generating debate and innovative research within the insurance sector. The UK charity Oxfam has been an active voice on climate change since 1986 and has raised concern that the human cost of these events is on the rise. The charity estimates that around 20 million people are forced from their homes annually due to climate related disasters and that adapting to climate change is costing Emerging Markets between \$140 to 300 billion per year.

#### Mapping the Landscape

"Climate change trends have been observed for the past few decades, but people tend to become more focussed after catastrophe events, such as we have seen in recent years," Jamie Rodney, Executive Director for ILS at Twelve Capital told Juniper Place. "A key difference now is that supranational organisations and governments have come together, and the research and the consensus view on the human-induced impact on climate change is stronger than before."

Recently, the spotlight has been on what are known as secondary events, such as convective storms, flash floods, droughts, and wildfires with much of Europe, North America, Asia, and Emerging Markets having seen an increase in the frequency and severity of these events in recent years. The Intergovernmental Panel on Climate Change (IPCC) has highlighted concerns on the relationship between rising temperatures and these types of catastrophe event.



Thomas Loridan, CEO of Reask, a science and technology start-up using data science to build NatCat risk models, explained that although the scientific community has not reached consensus as to the likely impact of climate change on all atmospheric events, there is a good level of consensus for certain natural disasters such as drought, wildfire, and extreme precipitation events.

"These events have not traditionally been the focus for the ILS industry," Rodney from Twelve Capital explains. Somewhat more positively he stated: "Due to their increased frequency there is scope for them to be better understood and for them to be modelled more efficiently." Although smaller in scale, these catastrophes are creating long-term losses, with severe convective storms generating around \$20 billion of damage annually in the US alone.

The physical and financial damage caused by Hurricane Andrew in 1992 was arguably the key catalyst for the insurance industry to take a more sophisticated and data driven approach to modelling the impact of cyclical climatological dynamics on natural catastrophes. However, it is really in the last five years that those models have been returned to calibrate not just extreme weather patterns, but to integrate the more linear pressures of climate change.

"The key is that climate change is causing a shift in the entire base line, while the natural variability and cyclical patterns such as El Niño or La Niña then determine whether you have a stronger or weaker event on an annual basis," Loridan from Reask explains. Therefore, it is essential to understand the role of each of these inter-related factors, which is where technology is lending a helping hand. "

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### **Technology-driven Forecasting**

Artificial Intelligence (AI) and high-resolution modelling are having a transformative role in understanding the frequency and scale of natural catastrophe and extreme weather events. Historically, catastrophe models have been based on retrospective data extrapolated across future time horizons using statistical models. "This is one of the key criticisms that we have of current catastrophe models, that we are stuck using the past to predict the future," says Loridan, who further highlights that this becomes even more acute when trying to factor in the long-time horizons of climate change.

Machine learning and AI are making natural catastrophe modelling much more accurate in predicting the volatility of atmospheric events. "The climate has already changed and the views that are used in the industry are backward looking. We need to change the baseline based on the changes that have already taken place," Loridan explains. "AI algorithms are used to identify meaningful patterns across time, patterns which are not easily identified by human observation alone." These patterns provide greater predictive skills and allow seasonal forecasts indicating how likely hurricanes are to develop or make landfall in a certain region, a core area which Twelve Capital and Reask have been collaborating on. They have produced extensive data and models forecasting the role climate change has in North American hurricane risk. "Better understanding the probability and nature of future events is fundamental in risk quantification and then pricing accordingly," Rodney from Twelve Capital explains.

Another key data challenge is the current geographical scope of natural catastrophe modelling which lacks holistic global coverage. "The biggest problem is that for places where the threat from natural disaster is often the highest, this is where observation data is poorest," says Loridan, and Al and InsurTech models are central to the solution. "Where observed data is not available, we use AI to recreate data by using high resolution modelling to re-simulate key climate signals and then apply forecasting models." Reask is using this unique methodology to build out global coverage for regions with relatively sparse data such as tropical cyclone risk in the South Pacific, and the South and North Indian Ocean.

## 66

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### The Human Impact

This democratisation of natural catastrophe data could be transformative for Emerging Markets where a lack of measurement instruments and historical data impacts the nature and availability of insurance coverage leading to very low levels of coverage, a phenomenon known as the Protection Gap. "The ratio of what is insured to the total economic exposure is often very low and this has a humanitarian impact," Rodney from Twelve Capital explains. "For the insurance markets to play a role in mitigating the impact of natural catastrophes, the Protection Gap needs to be bridged, and private market finance coming from alternative asset managers and ESG or impact investors, can represent the critical difference."

Innovative solutions such as risk premium subsidies and risk pooling offer two good examples of how risk is gradually being transferred to private markets and how NatCat modelling can be used to incentivise climate resilience projects. A recent example of this includes a collaboration between the UK government and the private sector which uses levies on insurance companies to subsidise insurance policies making flood cover more widely available and affordable. "ESG initiatives will certainly grow and there are many examples of this," Rodney explains. "The philosophy of the insurance and re-insurance space is that the premium of the many pays for the losses of the few, and this is definitely something which will help to bridge that Protection Gap. Of course, it must make sense from an economic perspective too, especially in the private sector."

Parametric solutions are another good example where there is potential to produce a positive social impact within the insurance industry. Nils Ossenbrink, Managing Partner for Products and Distribution at Twelve Capital references that more comprehensive data sets can more accurately predict the parameters of natural catastrophe events and thereby enable an underwriting framework for predefined insurance schemes. "This is a market that is really asking for disruption," Ossenbrink tells us. Parametric solutions have already brought a positive outcome within the tourism sector in Thailand and Fiji, providing faster pay-outs and greater transparency to communities hit by catastrophe who are dependent on the industry.

## 66

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### The Bigger Picture: Building Systemic Solutions

"Climate change offers both opportunities and costs for the insurance sector. Not addressing climate change can create negative impacts in terms of potential losses and regulatory scrutiny on the underwriting side. Conversely carbon reduction activities also creates opportunities such as positive externalities in terms of branding and distribution, whilst potentially reducing operating costs and a firms equity risk premium," says Daniel King-Robinson, Strategy Leader of Sustainability & Climate Investing at Twelve Capital.

Currently, Twelve Capital is carrying out an extensive proprietary mapping process of insurance companies with respect to both their asset and liability activities in the ESG space. King-Robinson highlighted that traditionally the focus within the industry sector has been on how companies are making changes to reduce the carbon footprint of their downstream activities.

This is where Twelve Capital aims to produce differentiated research by understanding how companies are also endeavouring to render their upstream activities more sustainable. The purpose is to assess how these companies are moving towards greener products, services, and operations and what they are doing to cut down on their operational carbon footprint. This includes the quantification of asset allocation to carbon intensive industries such as oil and gas, nuclear energy, and shipping and conversely, renewable energy, R&D and cleantech portfolios. Overall, the objective is for this data to contribute to targeting climate change at its root cause by facilitating the move towards Net-Zero. "There is a lot of firepower to effect climate change through the mobilisation of private capital and there are also financial opportunities that are assessed within our climate sustainability process," King-Robinson emphasised.

The growing pressure of climate change on natural catastrophe events is becoming ever starker. Events from the previous year, from Typhoon Rai in the Philippines, Hurricane Ida in the US and flooding in Australia are showing us that as a planet we need innovative solutions to limit the impact of these events, as they become more frequent and more erratic. As a result, the insurance sector is producing unique solutions with data mapping and InsurTech transforming our capacity to understand and predict the role of climate change as catalysts in these events. As Juniper Place has seen throughout this series, there is scope for the financial industry to be at the forefront of developing sustainable solutions and this momentum is generating capital targeted at making a meaningful impact.

### About Juniper Place

Juniper Place is a technology-led investor intelligence platform that transforms the nature of asset raising for alternative asset managers and investors. We provide our clients with the insight to enable them to segment and precisely target only those investors where there is genuine mutual interest. As part of this service, we offer bespoke Institutional and Family Office investor intelligence, advisory and placement services.

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