ADAPTING TO GLACIAL FLOODING

Disaster insurance for climate resilience

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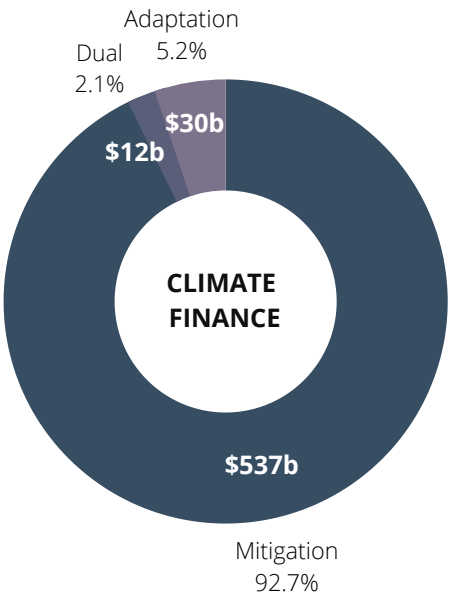


Climate change is increasing the frequency and severity of disasters and disproportionately impacting vulnerable groups at the frontlines of droughts, storms and floods. On one hand, damage can be prevented – every dollar spent on prevention saves $15 of disaster response. Yet in reality, climate adaptation is hugely underfunded, making up less than 7.5% of total climate finance in 2019. This investment deficit stems from risk and incentive problems. Namely, disaster prevention requires up-front costs without guarantee of tangible benefits, for which politicians and investors may not directly receive credit or returns. The policy solution we propose is a disaster insurance instrument that brings together relevant stakeholders to mobilize disaster prevention while putting the needs of the at-risk communities at its core.

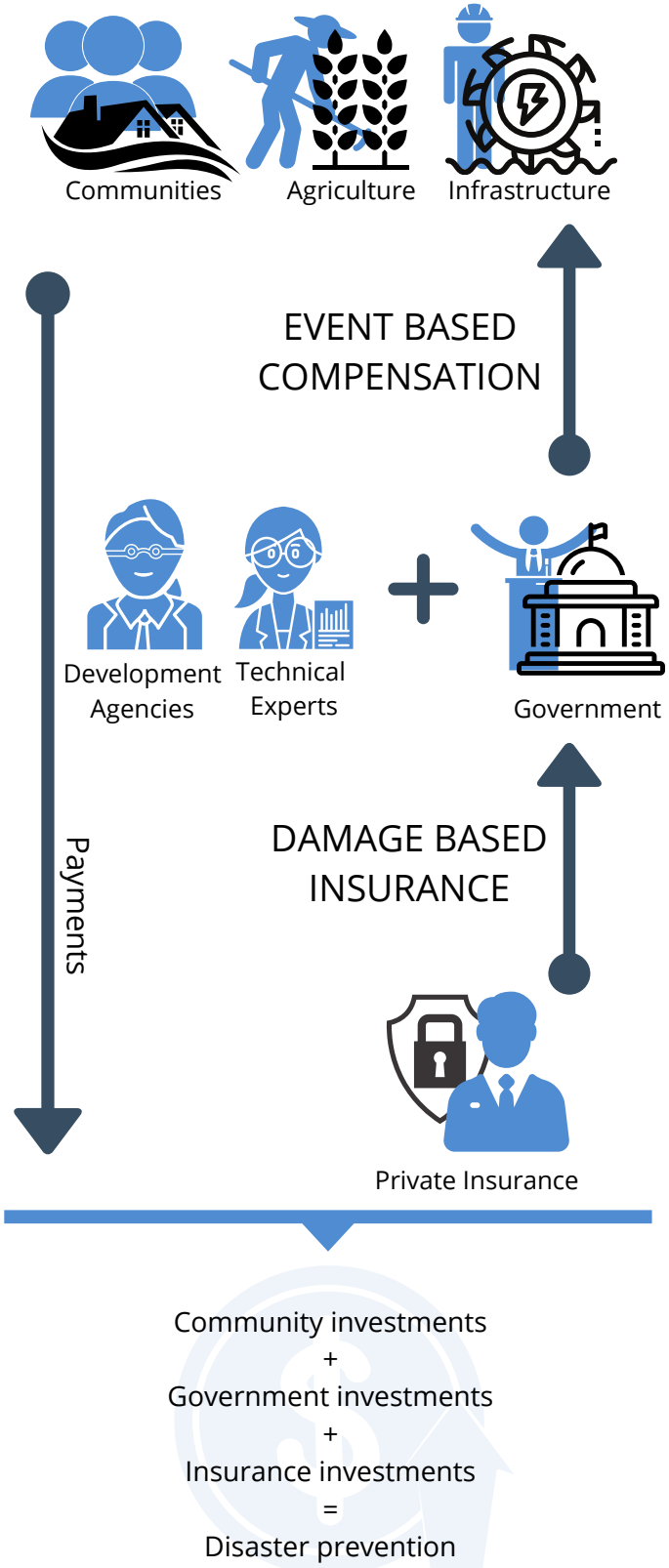
CASE STUDY: GLACIAL LAKE FLOODS

By the end of this century, between one-third and one-half of glacier ice in the Himalayas will be lost. Melted glaciers in the Himalayas accumulate into glacial lakes, that are at high risk of busting, causing downstream flooding. This is commonly referred to as Glacial Lake Outburst Floods (GLOFs). The consequences of this can affect millions of people who live in downstream communities

Draining lakes to prevent GLOFs is an expensive process and often not scalable. So far, only two out of the 3,624 glacial lakes have been partially drained. On the other hand, reactive measures such as early warning systems do not minimise economic costs from lost or damaged assets. Against this backdrop, there is a need for an integrated solution that offsets the rising costs of climate adaptation and safeguards the lives and livelihoods of downstream communities. Such a system must factor in uncertainty and clearly present benefits in order to drive incentives towards disaster prevention. This calls for an innovative solution that incentivizes all stakeholders to prevent the risks of GLOFs.

POLICY SOLUTION

Our solution is to implement a disaster insurance model that provides immediate event based compensation to communities and businesses, while claiming damage based compensation from insurance companies. This provides immediate relief for communities and aligns stakeholder incentives to invest in disaster prevention. While this model can be implemented in any context, we illustrate the steps of the model using our case study of glacial lake flooding in Nepal.



1. Government, with independent experts, conduct pre-ante assessments to decide the threshold of flooding that triggers automatic compensation.
2. Those at risk of flooding can opt into insurance, where flooding triggers pre-set government compensation. Thus, the community receives fast flood relief, whenever they experience major floods.
3. After disasters, government claims damage compensation from private insurance.
4. Insurers offer incentives for clients to implement flood proofing and may pursue their own flood prevention measures to avoid compensating for large damage.

INCENTIVIZING PREVENTION

Communities receive pre-set amounts of compensation, regardless of the damage they incur, so want to prevent flood damage where possible

Government wants to prevent flooding to safeguard the population and avoid political fallout

Insurance wants to prevent flood damage, because otherwise they must compensate it

This creates opportunities for blended finance to prevent flooding all together

Why it works

Insurance is at the heart of our solution because of its role as risk manager, risk carrier and investor. Traditionally, private insurers avoid insuring for disasters, in part because those who are insured are less likely to flood proof their assets and only those at high risk of flooding will purchase insurance. Yet, with a growing insurance market, we propose parametric insurance and pooling risks to overcome these challenges.

Event based (parametric) insurance makes a standard compensation payment whenever an event, such as 2m of flooding, is triggered. It is ideal for disasters because it can be quickly administered as it avoids surveying, assessing and quantifying damage post-flood. Meanwhile, it solves the problem of moral hazard, where once insured, households are less likely to invest in flood proofing. This is because, participants receive a fixed payment irrespective of the damage they incur, and still have the same incentives to prevent and avoid flood risks.

Pooling risks across communities can solve the "adverse selection" problem where only those at risk purchase insurance. We propose that the government incentivizes all communities living next to the 3 major rivers in Nepal to purchase flood insurance. In doing so, the costs and risks of a GLOF event that floods a particular river is shared with people who live next to the remaining two vulnerable rivers while realizing that their costs will be covered by other communities if a GLOF took place in their community as well. In many ways, this can be understood as a blended approach to green insurance as the raised premium payment can be subsidized by the national government as well as development partners who have an interest in climate adaptation in Nepal.

Benefits of the model

In the short-term, our solution provides immediate relief for communities to rebuild after climate disasters such as GLOFs. Meanwhile, it aligns the incentives of community, government and insurance to prevent GLOFs in the first place, creating opportunities for co-investment in climate resilience and save lives and livelihoods in the long-term.

MODEL VALIDATION - TSHO ROLPA GLACIAL LAKE

In the summer of 2018, our team administered surveys and interviews to assess communities' willingness to pay for flood prevention. We collected 405 paper-based surveys in the mountain town of Dolakha and the capital city of Kathmandu, and accordingly categorized participants in three different risk zones based on location. In addition, we traveled through the downstream region of Tsho Rolpa in Nepal to directly interview residents most at-risk of GLOFs. Although Nepal already spent $9 million to decrease the level of the Tsho Rolpa Glacial Lake by three meters, the lake needs to be further lowered by 20 meters to ensure safety. The economic damage of a potential GLOF event from Tsho Rolpa is estimated at $2.4 billion and the number of people who will be directly affected due to loss of resources is 141,911.

Households

Our survey highlighted that irrespective of the risk zones, respondents were willing to pay about $6.6 per year (equivalent to 0.8% of annual income) to support climate adaptation projects to contain potential glacial flooding from the Tsho Rolpa Glacial Lake. Scaling this number to the 4.1 million Nepali who live near major river tributaries gives us a figure of approx. $27 million in premium payment from the households alone.

"I am willing to pay for climate adaptation because climate change affects us socially, mentally, and physically." - Survey respondent

Industries

Hydropower plants are present in the upstream region and industries and factories in the lower regions. At present, Chilime Hydropower with a 22 MW capacity in the Bhotekoshi river in Nepal, for example, pays an annual insurance premium of $42,507. This translates to approx. $1932 of insurance premium per MW of electricity generated. Scaling this number to the 10,860 MW of potential electricity from the river results in an approx. $21 million coming from the hydropower sector alone.

Residents of Beding, Dolakha diverting the river away from their communities. (Rastraraj Bhandari)

Overall, we estimate that there is potential to generate $53 million just from premium payments from households and industries around the Koshi river basin. Meanwhile to diversify risks, funding agencies and development partners including the Green Climate Fund (GCF) could finance approximately $10 million annually, for a total of $63 million in payments for insurance companies alone.

In the event of a GLOF from the Tsho Rolpa Glacial Lake, 666,234 people will be directly or indirectly affected. In that case, people can receive approx. $97 as insurance payment for a $6.6 investment. The standard payment rate should be benchmarked on flood intensity and risk zones which can be assessed by an independent verifier. Against this background, our glacial flood assurance model would sufficiently safeguard the lives and livelihoods of residents.

EVALUATION

We propose launching this solution in 2021 for communities along the three major rivers of Nepal. In the first year, the government should partner with development agencies and experts to determine equitable thresholds and payment amounts for disaster compensation. Following, the model should be launched in 2022. Every six months from its launch, the development agency overseeing the project should independently evaluate the success of the project and the potential for it to be implemented in other regions and for other climate disasters. We suggest that the evaluation process should consider the following parameters:

Performance indicators:

- Affordability of insurance for low-income residents
- Proportion of riverside residents and businesses insured
- Dollars invested in glacier lake draining, flood gaging stations, and early warning systems for flooding
- Level of community awareness around glacier lakes and flooding risks

"If we can stop urgent climate disasters now, then we could always focus on other social issues later."
- Survey respondent

Our insurance scheme provides an opportunity to fund climate adaptation through multiple stakeholder alignment. Setting up and allocating funds to prepare for and respond to climate induced disasters is also a major objective of Nepal's National Adaptation Plan. Furthermore, the project integrates a community based approach with a top down approach for climate induced disaster prevention leading to higher national resilience. This supports SDG 13 on strengthening adaptive capacity of Nepal. Through these interventions, the financial strain on a community due to a climate induced disaster is reduced while climate induced disaster prevention is more actively practiced. The policy solution currently focuses on glacial floods in Nepal, but has the potential to be scaled as a transboundary intervention to tackle other climate induced disasters.

SOURCES

1. Barbara Buchner, Alex Clark, Angela Falconer, Rob Macquarie, Chavi Meattle, Rowena Tolentino and Cooper Wetherbee (2019). Global Landscape of Climate Finance 2019.
2. Healy, A., & Malhotra, N. (2009). Myopic voters and natural disaster policy. American Political ScienceReview, 103(3), 387–406. doi: 10.1017/S0003055409990104
3. ICIMOD (2011). Glacial Lakes and Glacial Lake Outburst Floods in Nepal.
4. ICIMOD & UNDP (2020). Inventory of glacial lakes and identification of potentially dangerous glacial lakes in the Koshi, Gandaki, and Karnali river basins of Nepal, the Tibet Autonomous Region of China, and India.
5. Ministry of Population and Environment (2016). Nepal's Nationally Determined Contribution (NDC). Nepal
6. Rowan Ann (2020). Two thirds of glacier ice in the Himalayas will be lost by 2100 if climate targets aren't met. The Conversation.