



**Munich Re
Foundation**
From Knowledge
to Action



**Eberswalde University
for Sustainable
Development**

Group 3: Rethinking Climate Risk Insurance

Adding important climate
change effects to the agenda

In case you lost
track, today is the
87th of March.

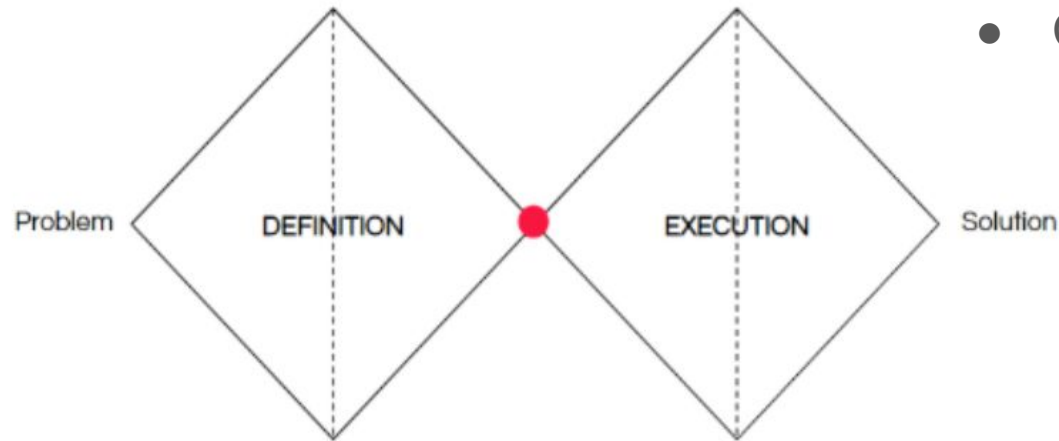
Content

Problem: Climate Risks

- Climate Risks
- Climate Risk Insurances (CRI)
- Example: Sea Level Rise

Solution: Rethinking CRI: PolySure

- User
- Index
- Implementation
- Financing + Establishing
- Conclusion



Team Members



Emma Tremiliti



Christine Falta



Steffen Dehn



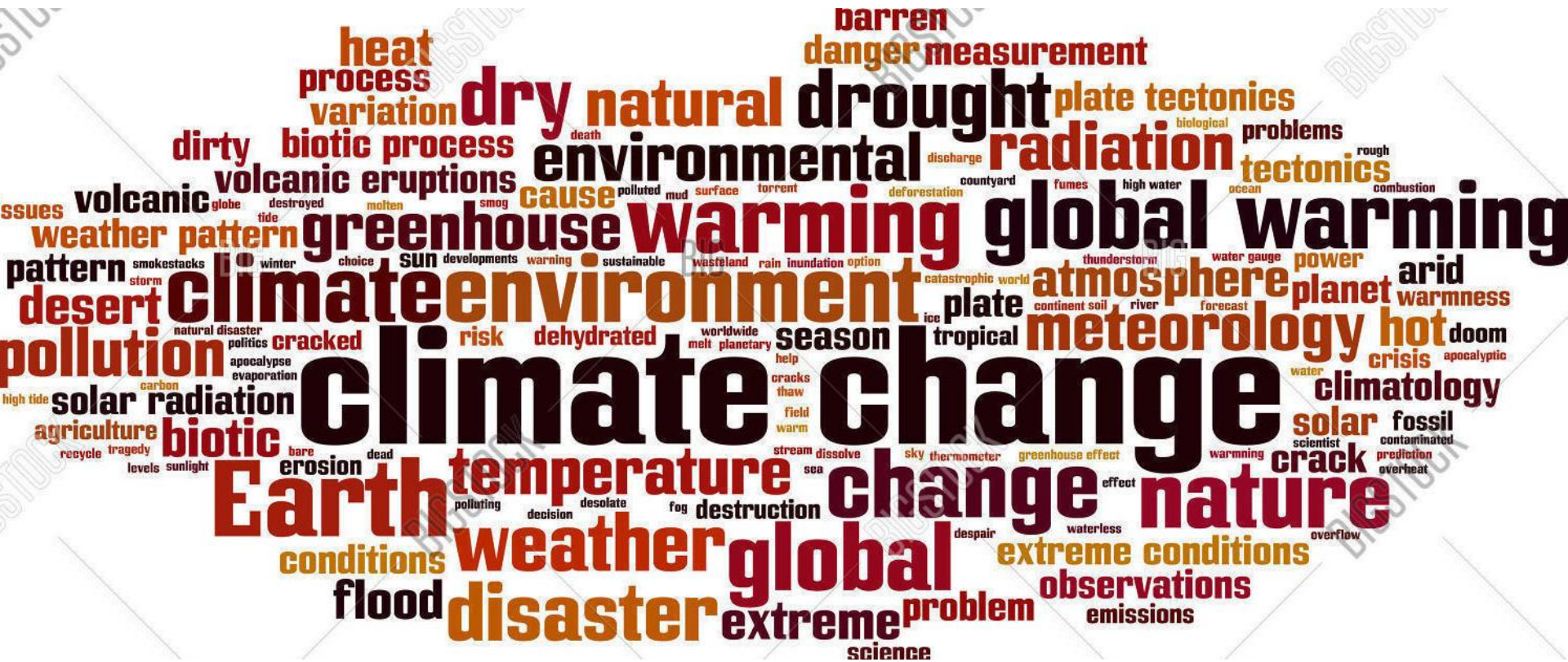
Cecilia Hanelt



Nikola Tietze



Luna Brandes





CLIMATE RISKS: 1.5°C VS 2°C GLOBAL WARMING



EXTREME WEATHER

100% increase in flood risk. vs **170%** increase in flood risk.

SPECIES

6% of insects, **8%** of plants and **4%** of vertebrates will be affected. vs **18%** of insects, **16%** of plants and **8%** of vertebrates will be affected.

WATER AVAILABILITY

350 million urban residents exposed to severe drought by 2100. vs **410 million** urban residents exposed to severe drought by 2100.

ARCTIC SEA ICE

Ice-free summers in the Arctic at least once **every 100 years.** vs Ice-free summers in the Arctic at least once **every 10 years.**

PEOPLE

9% of the world's population (700 million people) will be exposed to extreme heat waves at least once every 20 years. vs **28%** of the world's population (2 billion people) will be exposed to extreme heat waves at least once every 20 years.

SEA-LEVEL RISE

46 million people impacted by sea-level rise of 48cm by 2100. vs **49 million people** impacted by sea-level rise of 56cm by 2100.

OCEANS

Lower risks to marine biodiversity, ecosystems and their ecological functions and services at 1.5°C compared to 2°C.

CORAL BLEACHING

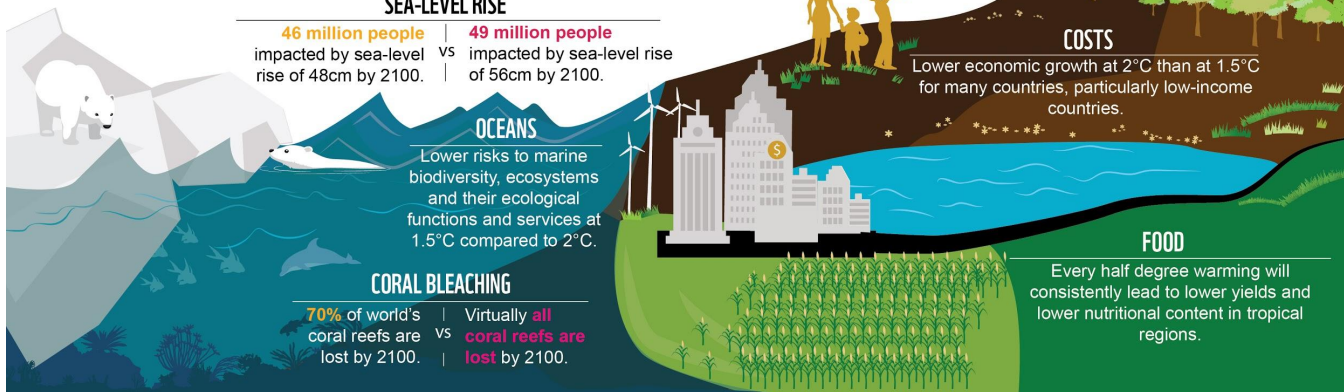
70% of world's coral reefs are lost by 2100. vs Virtually **all coral reefs** are lost by 2100.

COSTS

Lower economic growth at 2°C than at 1.5°C for many countries, particularly low-income countries.

FOOD

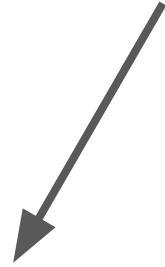
Every half degree warming will consistently lead to lower yields and lower nutritional content in tropical regions.



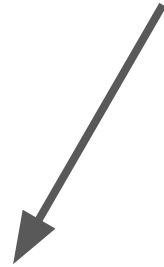
CLIMATE RISK



HAZARDS
NATURAL OR
HUMAN-MADE



EXPOSURE
SOCIAL RELATED



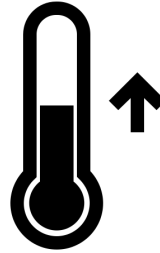
VULNERABILITY

Outcomes are a function of the vulnerability of the exposed assets which is applied in investments

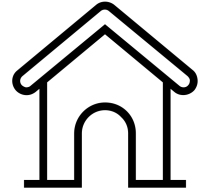
Climate Risk Insurance: Protection from the Impact of Climate Change



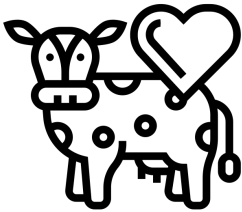
Created by HeadsOfBirds
from Noun Project



Created by Sumana Chamrunworakiat
from Noun Project



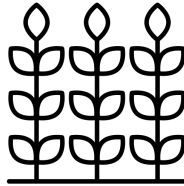
Created by Hat-Tech
from Noun Project



Created by Eucalypt
from Noun Project



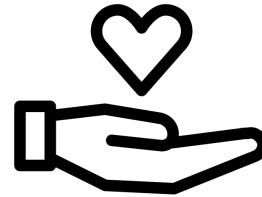
Created by Maxicons
from Noun Project



Created by Made
from Noun Project



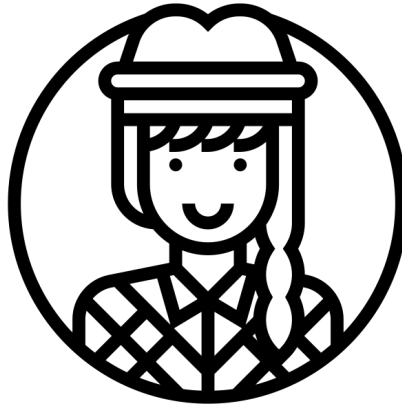
Created by Suog
from Noun Project



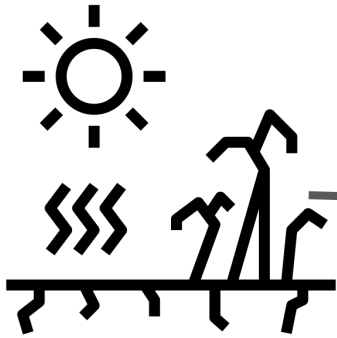
Created by Linker
from Noun Project



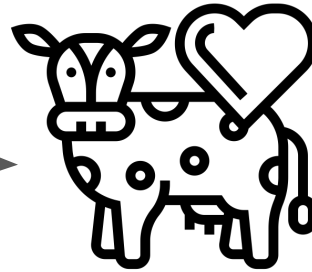
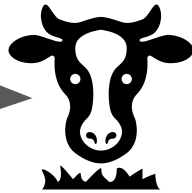
Created by LAFS
from Noun Project



Created by Eucalyp
from Noun Project



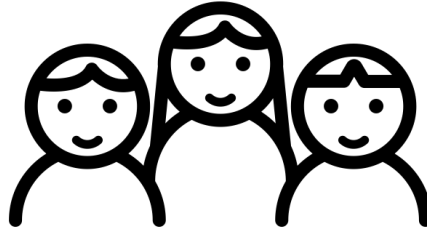
Created by Mavadee
from Noun Project



Created by Eucalyp
from Noun Project



Created by LAFS
from Noun Project



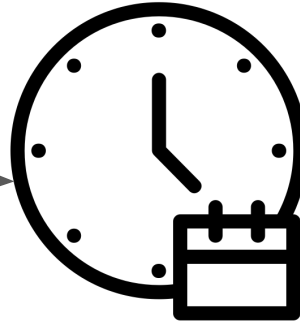
Created by Llisole
from Noun Project



Created by Mavadee
from Noun Project



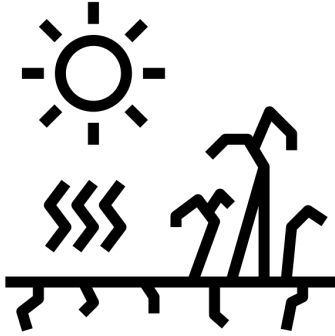
Created by corpus delicti
from Noun Project



Created by hazi dwianto
from Noun Project



Created by LAFS
from Noun Project



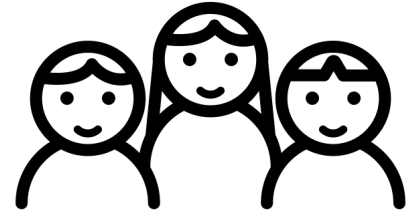
Created by Mavadee
from Noun Project



Created by Mavadee
from Noun Project



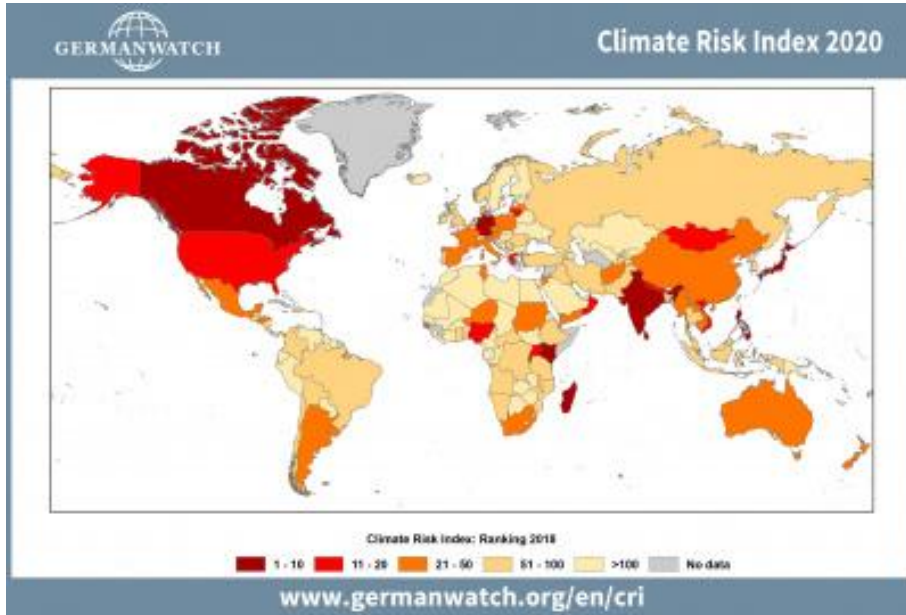
Created by Nociconist
from Noun Project



Created by Llisole
from Noun Project

CLIMATE RISK INSURANCE AS EFFECTIVE INSTRUMENT OF SUPPORT

The Global Climate Risk Index



GERMANWATCH Climate Risk Index 2020

Ranking 2018 (2017)	Country	CRI score	Death toll	Deaths per 100 000 inhabitants	Absolute losses (in million US\$ PPP)	Losses per unit GDP in %	Human Development Index 2018 Ranking
1 (36)	Japan	5.50	1 282	1.01	35 839.34	0.64	19
2 (20)	Philippines	11.17	455	0.43	4 547.27	0.48	113
3 (40)	Germany	13.83	1 246	1.50	5 038.62	0.12	5
4 (7)	Madagascar	15.83	72	0.27	568.10	1.32	161
5 (14)	India	18.17	2 081	0.16	37 807.82	0.36	130
6 (2)	Sri Lanka	19.00	38	0.18	3 626.72	1.24	76
7 (45)	Kenya	19.67	113	0.24	708.39	0.40	142
8 (87)	Rwanda	21.17	88	0.73	93.21	0.34	158
9 (42)	Canada	21.83	103	0.28	2 282.17	0.12	12
10 (96)	Fiji	22.50	8	0.90	118.61	1.14	92

The Global Climate Risk Index for 2018: the 10 most affected countries

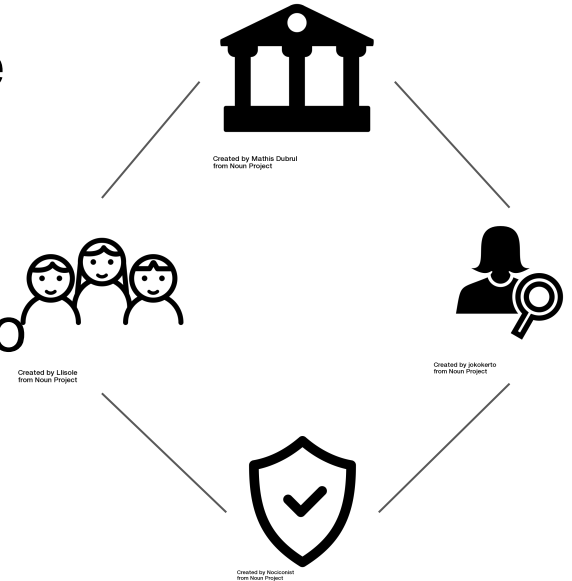
www.germanwatch.org/en/cri



Climate Risk Insurances for Individuals and States

Created by Nociconist
from Noun Project

- Build resilience for poor and vulnerable people in highly exposed and low income countries
- Take needs of all population groups into account
- Embed in early risk assessment
- Public private partnerships
- Affordable



How to insure important Global Change Effects?

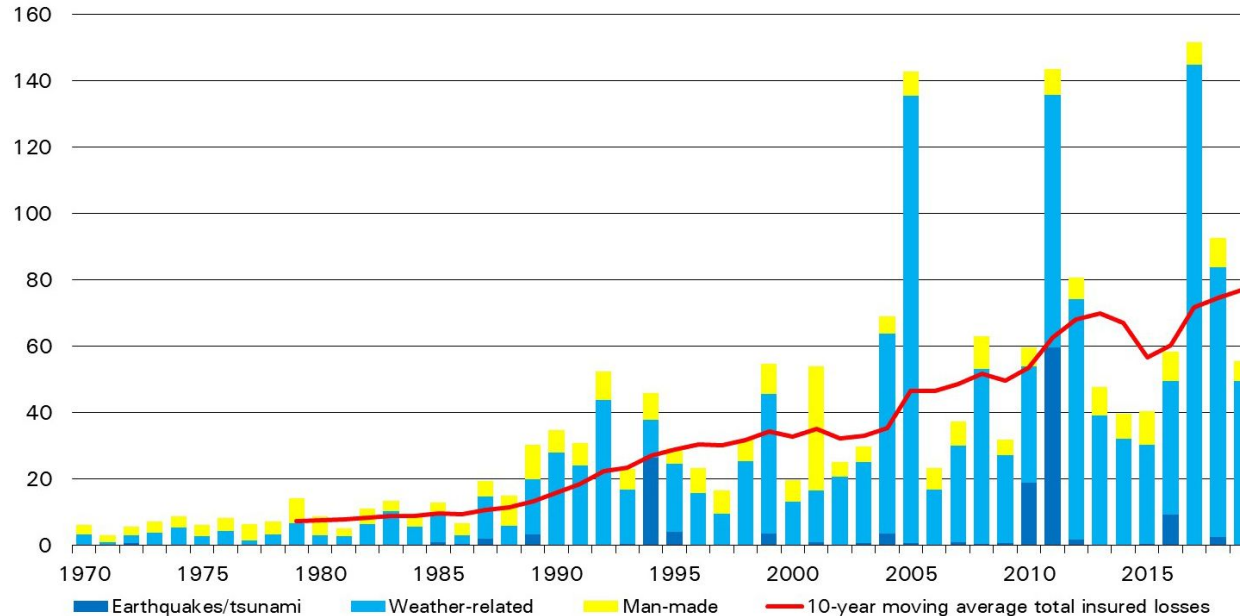
WE NEED TO RETHINK CLIMATE RISK
INSURANCES:

GLOBAL CHANGE EFFECTS CAN BE:

- Unforeseeable
- Monetary values hard to assess
- Monetary losses can not be calculated - loss and damage debate
- Causality may be complex and blurry due to ecological change, ocean acidification etc.

Catastrophe-related insured losses (1970-2019)

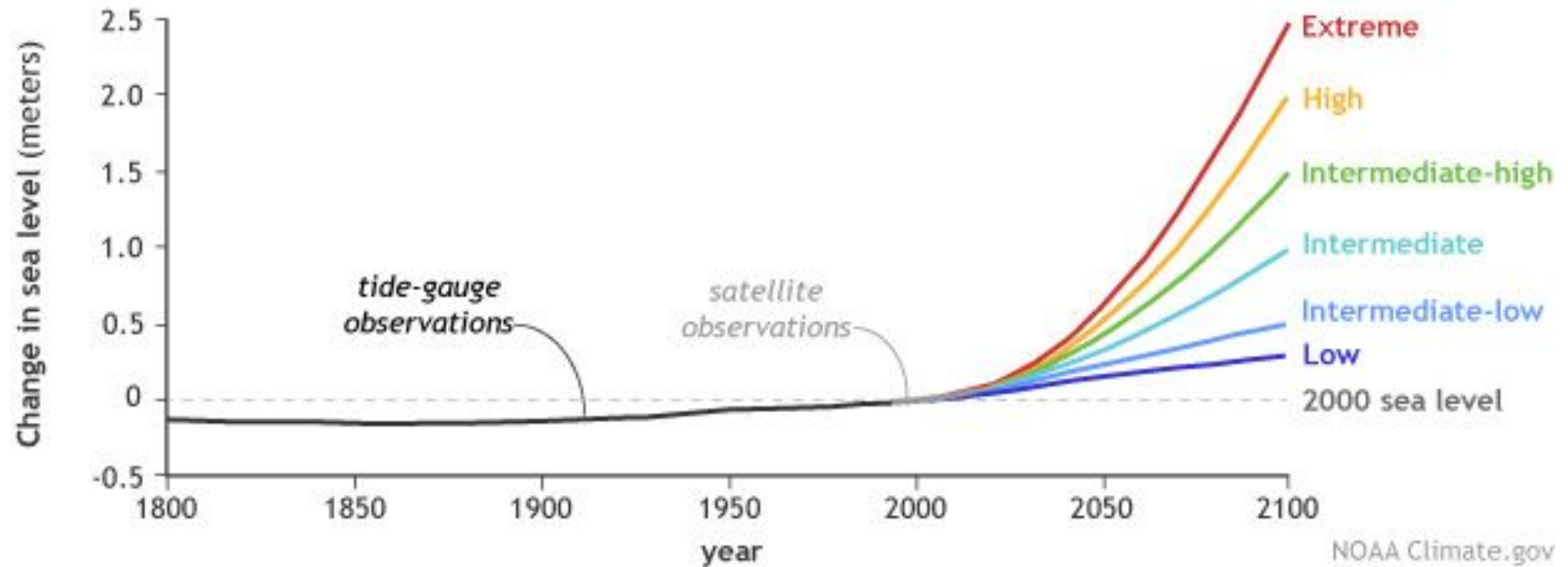
in USD bn,
at 2019 prices



Source: Swiss Re Institute

Sea level rise

Possible future sea levels for different greenhouse gas pathways



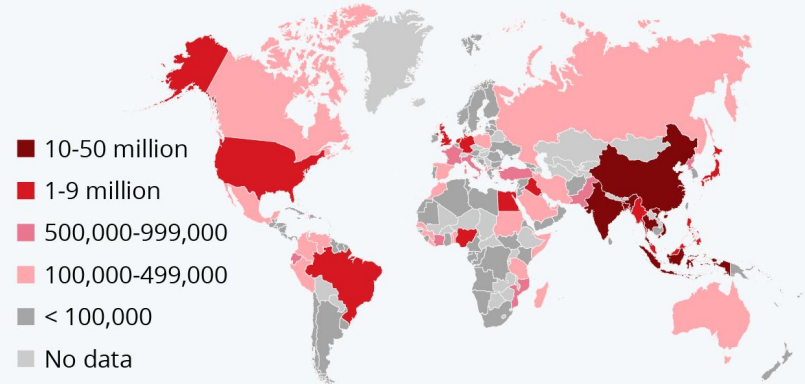
NOAA Climate.gov
Adapted from Sweet et al., 2017

Sea level rise

- Global mean sea level rise as a major climate risks
- 250 million people currently live on land below projected annual flood level
- 340 million will at mid century
- Adaptation to sea level rise as an important measure of protection

Where Most People Are Affected by Rising Sea Levels

Number of people per country living on land expected to be under sea level by 2100*



* assuming a rise in sea levels of 50-70 cm (2° C temperature increase/not taking into account ice sheet instability)

Source: Scott A. Kulp & Benjamin H. Strauss: New elevation data triple estimates of global vulnerability to sea-level rise and coastal flooding, Nature Communications



IPCC recommended responses

(a) No response



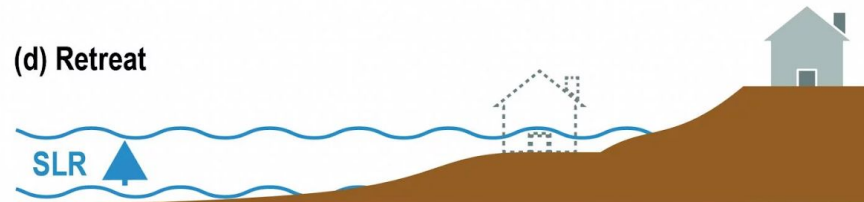
(b) Advance



(c) Protection



(d) Retreat



(e) Accommodation



(f) Ecosystem-based adaptation



What does that all mean for someone living on the island of Tonga in the Pacific?



Source: JHuba

Understanding our user

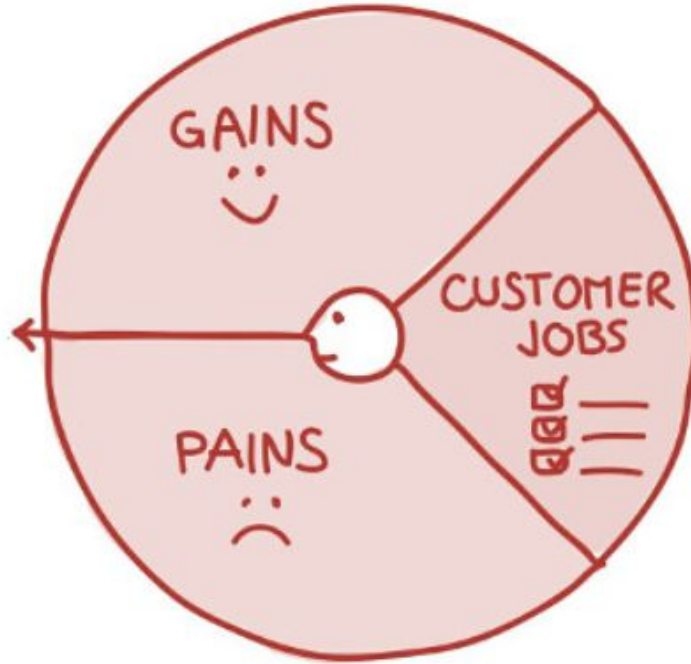
Joe, 43 years old, married two children, farmer in Tonga:

- Family hard hit by cyclone in February 2018 and rising sea levels
- Received support through the PCRiC scheme
- Afraid similar things will happen in the future that makes it impossible for him to continue farming in the area



Source: FLIA

Understanding our user



Understanding our user

Jobs to be done:

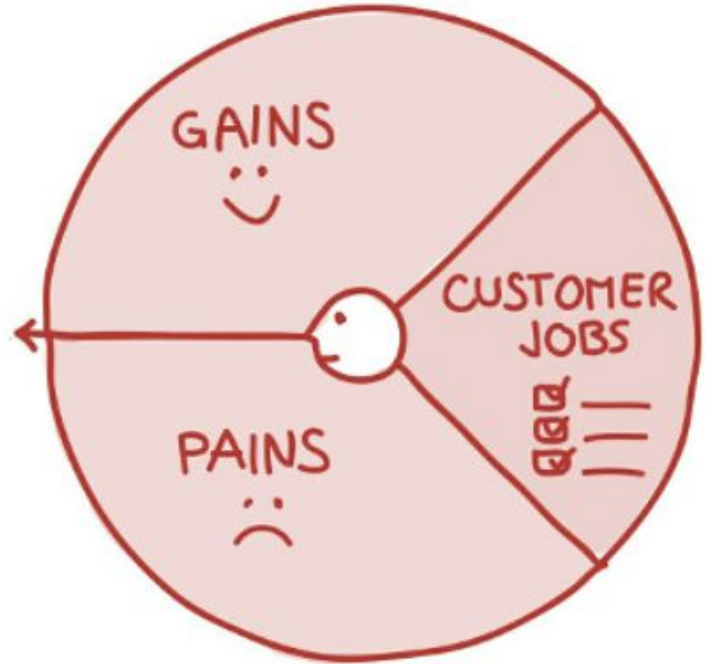
- Earning money to keep his family alive
- Providing food to ensure food security on the island
- Adapting his activities to a changing climate

Pains:

- High uncertainty about his and his families future
- No financial means to adapt to climate change, relocate his livelihood or upskill
- There are only pay outs if something bad happens (reactive) and little is being done to be proactive









Gains:

- Fast provision of payouts after the last catastrophe
- Trusts the national government to do the right thing
- Learned more about international activities to limit climate change after last cyclone



Warming by 2100

Physical impacts

	<2 °C		3 °C	5 °C
	1.5 °C	2 °C		
 Sea-Level Rise (cm)	0.3-0.6 m	0.4-0.8 m	0.4-0.9 m	0.5-1.7 m
 Coastal assets to defend (\$tn)	\$10.2tn	\$11.7tn	\$14.6tn	\$27.5tn
 Chance of ice-free Arctic summer	1 in 30	1 in 6	4 in 6 (63%)	6 in 6 (100%)
 Tropical cyclones:	Fewer (#cat 1-5)	-1%	-6%	-16%
	Stronger (# cat 4-5)	+24%*	+16%	+28%
	Wetter (total rain)	+6%	+12%	+18%
 Frequency of extreme rainfall	+17%	+36%	+70%	+150%
 Increase in wildfire extent	x1.4	x1.6	x2.0	x2.6
 People facing extreme heatwaves	x22	x27	x80	x300
 Land area hospitable to malaria	+12%	+18%	+29%	+46%

The Paris Agreement // Insurance Companies

- **Goal:** Staying well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels”
- **Challenge Identified:** Insurance companies struggle with the tipping points in a changing climate since no one is able to predict accurately how warming above 2°C will impact the world. It even seems at times no one believes in humanity being able to reach the 2°C limit.
- **Hypothesis:** Risk assessment is somewhat possible based on the assumption that we manage to stay below 2°C.

Understanding our solution

- **Baseline:** People's lives depend on the successful implementation of the Paris Agreement.
- **Assumption:** If we don't achieve the goals of the Paris Agreement, many people around the world will have to change their way of living drastically in order to adapt to a changing climate. Insurances and social protection instruments can play a major role in supporting people to transition to safer livelihoods in case we fail to meet the Paris Agreement goals.



Value Proposition

Mission: We offer certainty in a world of uncertainty.

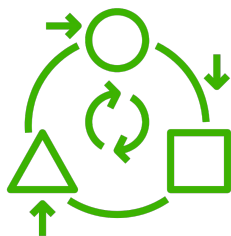
Vision: People living in high risk areas get general protection/safety nets to build a new livelihood if Paris Agreement targets are not met.

Tagline: We insure people against policy failure.



How does it work?

Setting up a facility that supports people in high-risk areas on a local level to:



Adapt to climate change by using 10% of the total volume of the fund to finance capacity building to carry out risk reduction activities.

Proactive vs. Reactive:

We support you before disasters strike.



Have enough monetary resources to start a new life with your family somewhere else if climate change impacts make it impossible for you to

1. Carry out your profession
2. Stay in your home

Resources when needed:

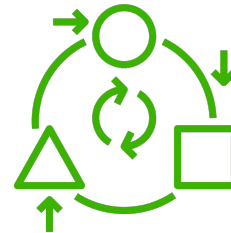
We make sure you have your basics covered in the worst case scenario.

How does it work?

We insure people against policy failures. To achieve this, we use the following index:

If global temperatures reach levels above 2°C (and sequentially 3°C and 5°C), a partial payout is triggered to support people in high risk areas in

- Securing their livelihoods against climate change (adaptation activities)
- Relocating their livelihoods
- Re-/Upskilling their workforce



What is different?

- Long-term insurance (until the year 2050 + potential renewal)
- Proactive not reactive
- Based on implementation of policies not destruction of assets



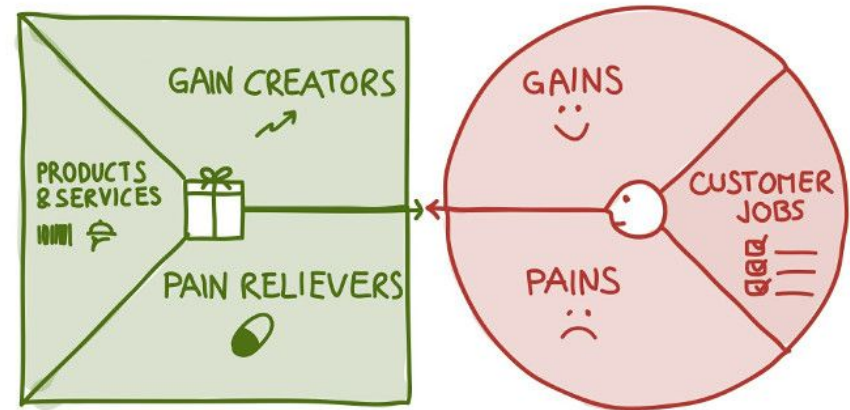
Matching our Value Proposition with User Needs

Gain Creators:

- Building long-term relationships so people can build trust and capacities to adapt to the unavoidable
- Secure, easy to access financial means in case of a worst-case scenario
- Access to information and expert advice
- Setting up the infrastructure so that if disasters hit, payouts can happen fast

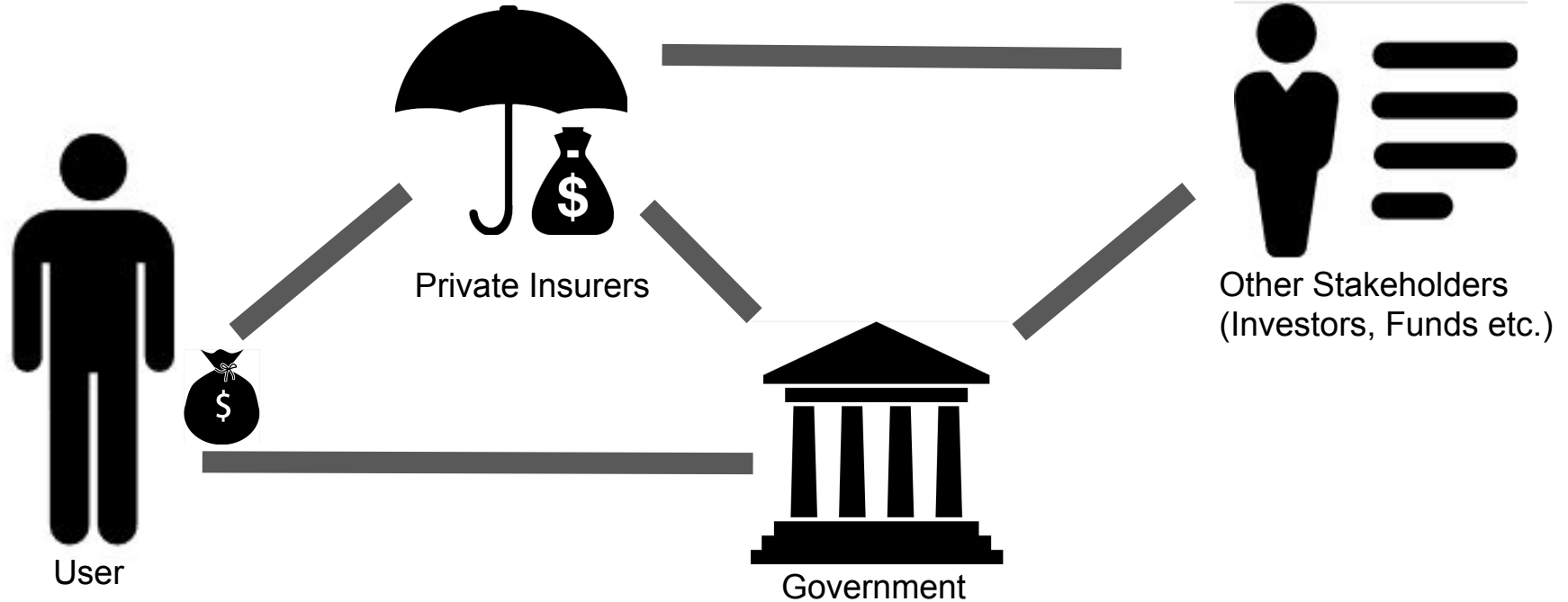
Pain Relievers:

- By linking the payout to not achieving policies that have implications for future catastrophes triggered by climate change and not the catastrophe itself, we create value for the customer since they receive financial means to build a new life before their livelihood is being destroyed.



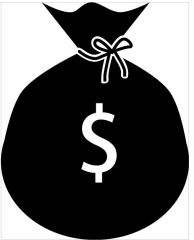
How can we move towards implementation?

Stakeholders / Responsibility



Private vs. Public Climate Risk Insurances

Financial Liquidity



Public



Private



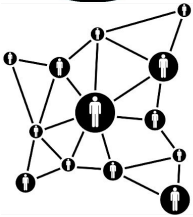
**

Accuracy of Risk Reflection/Pricing



**

Coordination



**

	Public	Private
Financial Liquidity	****	**
Accuracy of Risk Reflection/Pricing	**	***
Coordination	****	**

Private vs. Public Climate Risk Insurances



➔ Public Insurance has advantages

Designing a Public Climate Risk Insurance

2 Options to Implement

1) exclusively public



2) public program + private insurers



Option I: Exclusively Public CRI



- Unifies everything in one tool

- tendency to underprice/value risk
- mute prices send wrong incentives


Solution:



- Transparency & accountability provided by disclosure on regular basis as incentive to keep policies accurately priced


Option II: Partnerships of



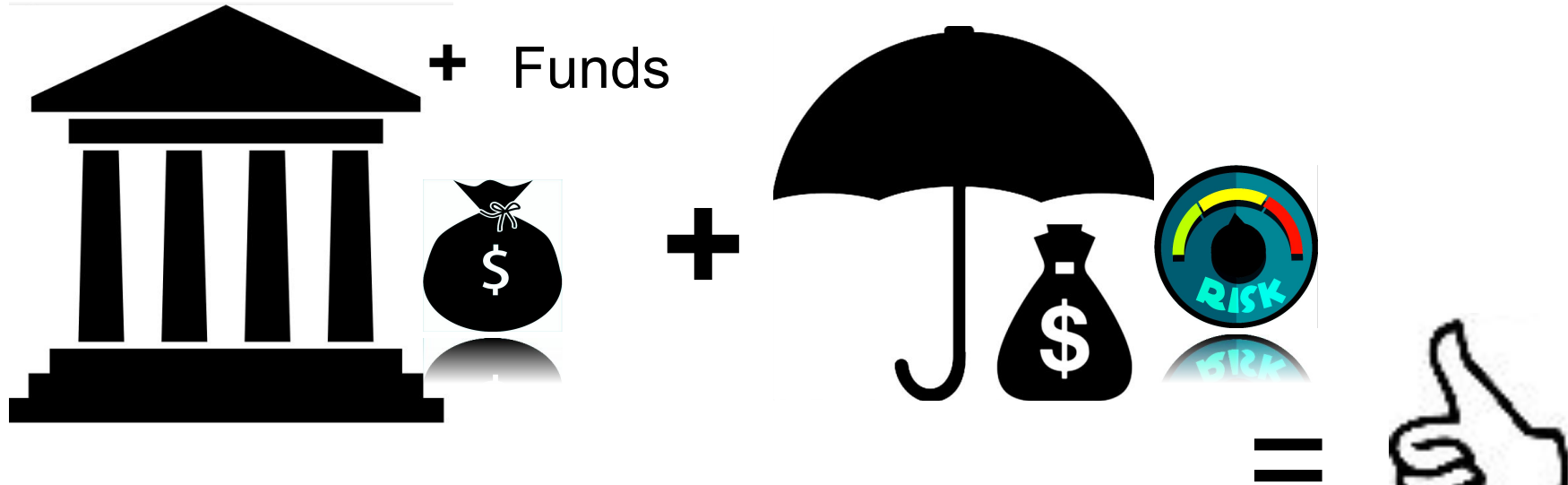
Public Programs + Private Insurers

1.  prices policies & financially responsible (paying out)

 administers program & sells policies
2.  commits to sharing some losses incurred

 pricing, selling & administering policies
3. Possibly financed via (climate) funds

CRI Implementation: Preliminary Conclusion



- ➔ Both private & public insurances CAN insure
- ➔ Our Solution = Combination is best

Launching PolySure

Step 1: Need for financial means to launch the facility

Step 2: How to design the facility/mechanism?

Step 3: Future Scenarios

A) What if we reach the Paris Agreement?

B) What if we fail to reach the Paris Agreement?



Step 1: Establishing the Climate Risk Facility



Using the GCF to establish PolySure

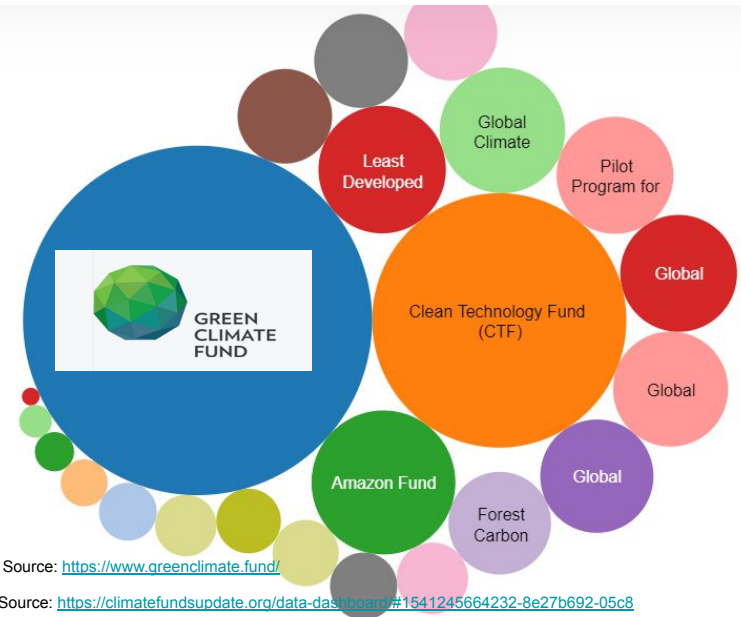
- Set up in 2010, serves the Financial Mechanism of the **UNFCCC and the Paris Agreement**
- Gathered pledges of approximately USD **10.3 billion**

Purpose:

- Respond to climate change in eight result areas by
 - Mitigation
 - Adaptation

Special Attention to:

- Least Developed Countries (LDCs)
- Small Island Developing States (SIDS)
- African States



Source: <https://www.greenclimate.fund/>

Source: <https://climatefundsupdate.org/data-dashboard/#1541245664232-8e27b692-05c8>

Step 2: How to design the facility ?



How to generate premiums?

- Payment via mobile phone?

= paid by **insured people** + **government subsidies** (→ **fund**)

Including the polluter-pays principle?

- Indirectly via **Green Climate Fund**
- What if people around the world can **buy the insurances for others?**
(risk: “selling of indulgences”)
- Crowdfunding?
- Sustainable Investments



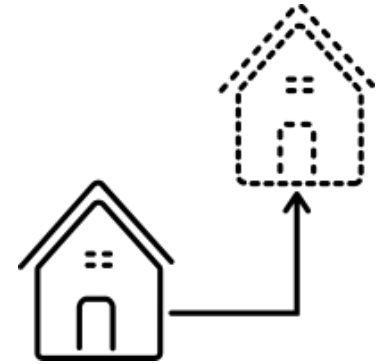
Step 2: How to design the facility ?

Plus: Adaptation activities & Capacity building

- ~ 10% of the total volume of the fund
- Risk reduction activities, adaptation
- Support for poor people via “cash for work”
→ make premiums affordable

In general:

- Multisectoral cooperation
- Prevention & relief



Step 3: Future Scenarios - Utopian path

Index shows Insurance is not accountable
(= Reaching the 2°C goal)

→ Insured people get not paid by the Climate Risk Insurance

What to do now?

→ “traditional path”: insurance keeps the money

Alternative ways:

- “Renew the contract” for the next period with adapted conditions?
- Create new funds? (legal issues!)
- Help those who suffer despite reaching the Paris Agreement



Step 3: Future Scenarios - Dystopian Path

Index shows Insurance is accountable (= Failure of the 2°C goal)

→ **Insured people get paid by the Climate Risk Insurance**

Payout depends on

- Did the respective country reach its NDCs?
- Which IPCC scenario is the most likely to happen?
(adequate scale to be calculated by experts)



In addition to the CRI: **other financial mechanisms within a broader financial scheme needed:** Cat Bonds, Emergency funds, Taxes...

Fact Sheet: PolySure

Concept

- Create incentives for governments to reach NDC's & 1.5°/ 2° goal
- Insure (the most) vulnerable people against risks resulting from failure of reaching the goals

Value

- Safety net against climate risks resulting from missing the Paris Agreement goals
- Trust in government
- Financing adaptation and providing climate change-related payouts

Challenges & Open Questions

- Accessibility of financing
- Proceeding after the period (2050)
- Realistic Idea? Details? Further questions..

Open Questions & Challenges

Regarding the **GCF**:

- How to encourage more national or even regional projects?
- How to make the financing more accessible?

General Questions:

- How to encourage more private investors to participate?
- How to prevent undesired side-effects and maladaptation?
- Are there ways to make polluters pay?
- What is realistic? What is impossible?
- Many more ;-)

Literature

Allianz (2016): Climate Risk Insurance: New Approaches and Schemes, Allianz Working Paper https://www.allianz.com/content/dam/onemarketing/azcom/Allianz_com/migration/media/economic_research/publications/working_papers/en/ClimateRisk.pdf

Geneva Association (2013): Warming of the Oceans and Implications for the (Re)insurance Industry. A Geneva Association Report. Access Online: https://www.genevaassociation.org/sites/default/files/research-topics-document-type/pdf_public/ga2013-warming_of_the_oceans.pdf.

Green Climate Fund (2020): About us:About GCF. GCF is the largest global fund dedicated to help fight climate change. Access Online: <https://jobs.greenclimate.fund/>, last accessed 02.04.2020.

Hellmuth M.E., Osgood D.E., Hess U., Moorhead A. and Bhojwani H. (eds) 2009. Index insurance and climate risk: Prospects for development and disaster management. Climate and Society No. 2. International Research Institute for Climate and Society (IRI), Columbia University, New York, USA.

Literature

Peter Molk (2016): The Government's Role in Climate Change Insurance, 43B.C. Env'tl. Aff. L. Rev.411 (2016), <http://lawdigitalcommons.bc.edu/ealr/vol43/iss2/7>

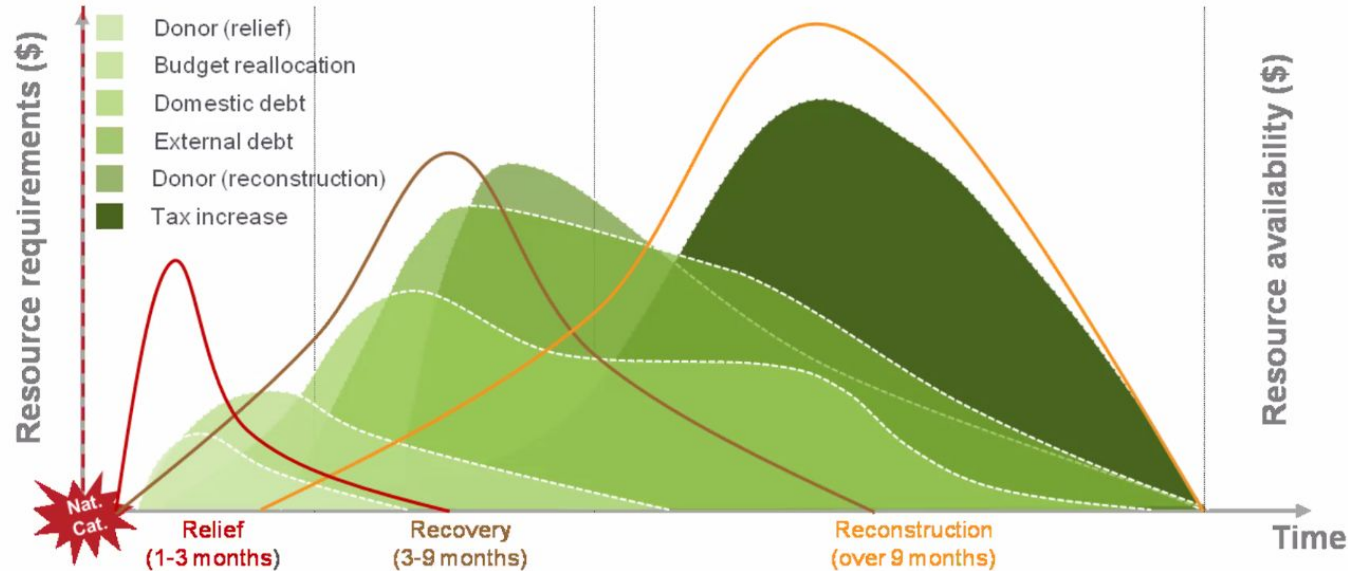
United Nations University, Institute for Environment and Human Security (2017):7 things you need to know about climate risk insurance. Access Online:<https://ehs.unu.edu/blog/5-facts/7-things-you-need-to-know-about-climate-risk-in-surance.html>

Warner, K., Yuzva, K., Zissener, M., Gille, S., Voss, J. and S. Wanczeck (2013). Innovative Insurance Solutions for Climate Change: How to integrate climate risk insurance into a comprehensive climate risk management approach. Report No. 12. Bonn: United Nations University Institute for Environment and Human Security (UNU-EHS), Access Online: <http://i.unu.edu/media/ehs.unu.edu/news/3796/11484.pdf>

Role / Responsibility of Governments

Post-Disaster Finance Demand for a Government

Short-term and long-term funds are needed



Demand for and availability of resources can change significantly following a quake.

References

Armstrong, R. (2020). Climate change: can the insurance industry afford the rising flood risk? Retrieved from <https://www.ft.com/content/757d4cf8-4e51-11ea-95a0-43d18ec715f5>

Rhodium Group, (2020). Clear, Present and Underpriced: The Physical Risks of Climate Change. Retrieved from https://rhg.com/wp-content/uploads/2019/03/RHG_PhysicalClimateRisk_Report_April_Final.pdf

Global catastrophes caused USD 56 billion insured losses in 2019, estimates Swiss Re Institute (2019). Retrieved from <https://www.swissre.com/media/news-releases/nr-20191219-global-catastrophes-estimate.html>

IPCC, 2019: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. Retrieved from <https://www.ipcc.ch/srocc/chapter/chapter-4-sea-level-rise-and-implications-for-low-lying-islands-coasts-and-communities/>

Kulp, S.A., Strauss, B.H. New elevation data triple estimates of global vulnerability to sea-level rise and coastal flooding. Nat Commun 10, 4844 (2019). <https://doi.org/10.1038/s41467-019-12808-z>