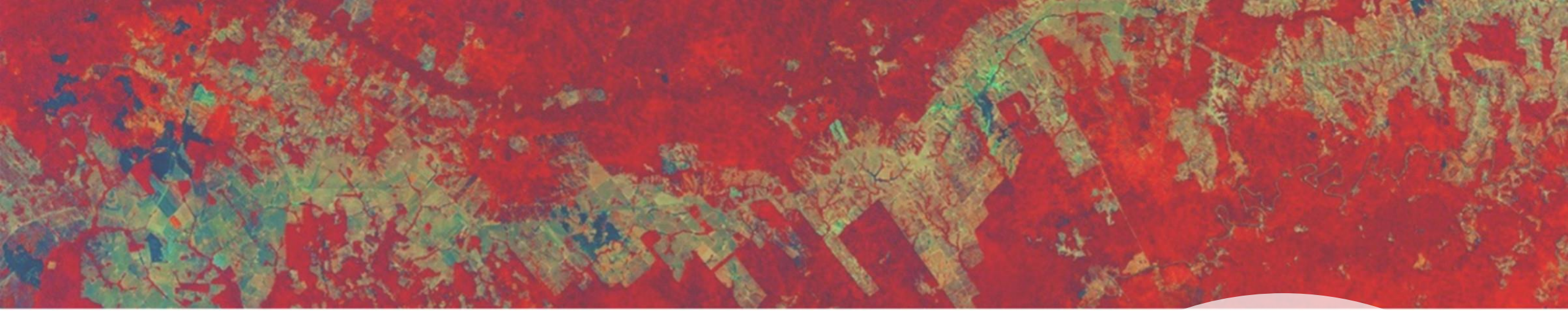

GEO CLIMATE WORKSHOP
POLICY + FINANCE

21-23 SEPTEMBER 2021

Welcome!

The meeting is starting soon

Since 2019 Dr Sara Venturini has been leading GEO's work to advance the use of Earth observations in support of climate action by UN member countries and partners. She has over 12 years' professional experience collaborating with UN bodies and advising governments and organisations on developing climate change adaptation policies, accessing climate finance, and participating in multilateral negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC). As a climate change advisor, she has worked with countries in the Caribbean and Indian Ocean, the Western Balkans, Central Asia, the Middle East, and Europe. She put her scientific expertise at the service of art projects, including the film anthology "Interdependence" that premiered at the Film Festival of Rome in 2019. She holds a PhD in Climate Change Science and Management from Ca' Foscari University of Venice, Italy.

Sara Venturini
Climate Coordinator
GEO Secretariat

GEO Climate Policy + Finance Workshop

Structure

	Tuesday, 21 September 2021	Wednesday, 22 September 2021	Thursday, 23 September 2021
9.00 – 12.00 CEST			**Day 3:** **EO for climate finance decisions**
12.00 – 15.00 CEST	**Day 1:** **EO for national climate action**		
15.00 – 18.00 CEST		**Day 2:** **EO for collective ambition on climate**	

GROUP ON EARTH OBSERVATIONS

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Day 3: EO for climate finance decisions

Opening of Day 3		
09.00-09.05 (5 min)	Introduction Welcome and recap from Day 1+2	**Sara Venturini** Climate Coordinator, GEO Secretariat
09.10-09.20 (10 min)	GEO Secretariat's vision on EO and climate finance	**Yana Gevorgyan** Director, GEO Secretariat
Session 1: EO in support of public climate finance		
09.20-09.30 (10 min)	How EO can strengthen funding proposals for climate action projects under the Green Climate Fund	**Joseph Intsiful** Senior Climate Information and Early Warning Systems Specialist, GCF
09.30-09.40 (10 min)	Systematic Observations Financing Facility: innovating finance to support sustained international exchange of foundational weather and climate observations	**Markus Repnik** Director of Development Partnerships, WMO
09.40-09.50 (10 min)	Supporting Improved Access to Climate Finance in Pacific SIDS – The CommonSensing Approach	**Einar Bjørgo** Director of UNOSAT, UNITAR **Unnikrishnan Nair** Head of Climate Change, The Commonwealth Secretariat
09.50-10.20 (30 min)	Q&A Open Discussion: • How can EO support better access to climate finance by developing countries? • How can the GEO community contribute to ongoing or new initiatives?	All speakers Moderator: **John Firth** Senior Director, Climate and Resilience Hub, WTW
Short break		

GEO GROUP ON EARTH OBSERVATIONS

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Day 3: EO for climate finance decisions

Session 2: EO in support of private climate finance

10.30-10.40 (10 min)	EO for new risk finance applications	**Antoine Bavandi** Senior risk finance specialist, Crisis and Disaster Risk Finance team, the World Bank
10.40-10.50 (10 min)	Mobilizing the financial sector to confront climate risk	**David Carlin** TCFD Program Lead, UNEP FI
10.50-11.00 (10 min)	Acorn: Unlocking the voluntary carbon markets with remote sensing	**Jelmer van de Mortel** Head of Acorn, Rabobank **Mila Luleva** Head of Remote sensing Acorn, Rabobank
11.00-11.10 (10 min)	Asset-level Insights for Private Climate Finance	**Christophe Christiaen** Sustainable Finance Lead, Satellite Applications Catapult / Innovation and Impact Lead, Oxford Sustainable Finance Programme
11.10-11.20 (10 min)	GIZ & Allianz RE & HKV Consultants – SAGABI Project : Pilot Public Asset Insurance – Climate Finance Mechanism for Cities, Ghana	**Dominik Aulehner** Senior Analyst, Allianz RE **Matthias Range** Team Leader, German International Cooperation (GIZ) **Job Udo** Senior Consultant, HKV
11.20-11.30 (10 min)	The Global Resilience Index - A Public Private Collaboration to build a common language of risk	**Matthew Foote** Senior Director Research and Analytics, Climate and Resilience Hub, WTW
11.30-11.50 (20 min)	Q&A Open Discussion: • How can EO become the next lever in private climate finance? • How can the GEO community contribute to ongoing or new initiatives?	All speakers Moderator: **John Firth** Senior Director, Climate and Resilience Hub, WTW

Day 3: EO for climate finance decisions

Closing

11:50-12:00 (10 min)	Summary and Workshop Closing	**Sara Venturini** Climate Coordinator, GEO Secretariat **Yana Gevorgyan** Director, GEO Secretariat

Workshop protocol

- Change your name into 'Organisation: Name Surname'
- Participants: use the Q&A box for questions
- Speakers: keep within time limits
- Be aware that the meeting will be recorded for workshop report
- Twitter **#EO4IMPACT** and follow @GEOSEC2025

Yana Gevorgyan is the Director of GEO Secretariat since July 2021. Ms. Gevorgyan is an expert in international relations whose career spans humanitarian relief and development, international think tanks, and government organizations. Prior to her selection as the next Director of GEO Secretariat, Ms. Gevorgyan was the GEO Program Manager at the U.S. National Oceanic and Atmospheric Administration's (NOAA). She had represented the United States to GEO in many capacities, including as a Co-Chair of the GEO Programme Board until May 2021. As a member of the United States delegation, Ms. Gevorgyan spearheaded several key initiatives in GEO, including the landmark policy on GEO Associates, the GEO Awards and GEO Pledge Campaign.

Yana Gevorgyan
Director
GEO Secretariat

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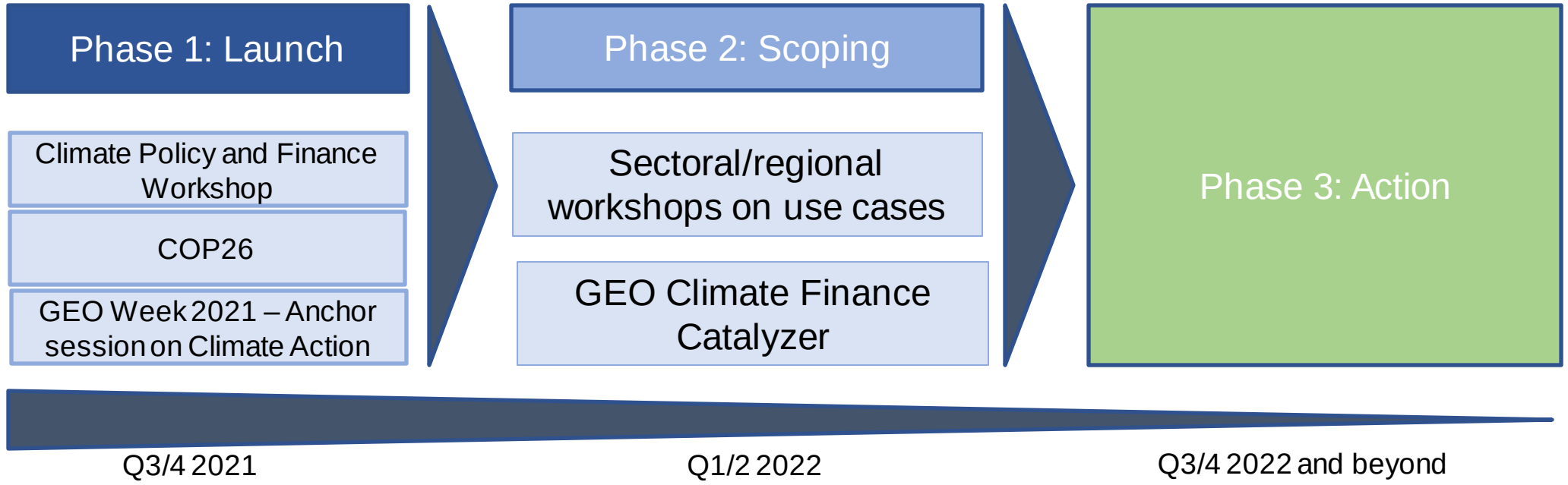
GEO Secretariat's vision

GEO Climate Finance Campaign



Session 1

EO in support of public climate finance

Joseph Daniel Intsiful is the Senior Climate and Early Warning Systems Specialist at the GCF. He holds a PhD in Mathematics and Natural Sciences from the University of Bonn. He leads the GCF portfolio on climate information and early warning systems worth over $1 billion and has over 20 years of experience in supporting developing countries to implement climate change projects in over 100 developing countries globally.

Prior to joining the GCF, he held the following positions: Senior Climate Science Expert at the UN Economic Commission for Africa; Climate Change Impacts, Data Collection and Analysis Expert of the UNDP African Adaptation Programme; and Liaison and Training Manager of the UK Met Office Hadley Centre's regional climate model PRECIS.

Joseph Intsiful (PhD)
Senior Climate Information and Early Warning Systems Specialist
Green Climate Fund

GEO CLIMATE POLICY AND FINANCE WORKSHOP

How EO can strengthen funding proposals for climate action projects under the Green Climate Fund

Joseph Intsiful (PhD), Green Climate Fund
23 September 2021

GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

BARRIERS

Lack of enabling environment for **institutional effectiveness**

Limited governmental finances and **budgets** allocation (e.g. NMHS & NDMA).

Lack of coverage and scale for effective service delivery in terms of quantity and quality of **hard infrastructure** and inadequate **soft infrastructure** for ensuring delivery and uptake of risk information.

The **complexities of production, dissemination and uptake of risk information**

Uncoordinated interventions limit the effectiveness of existing support to developing countries.

Market barriers to creating enabling conditions

GCF PORTFOLIO

GCF funding (USD)

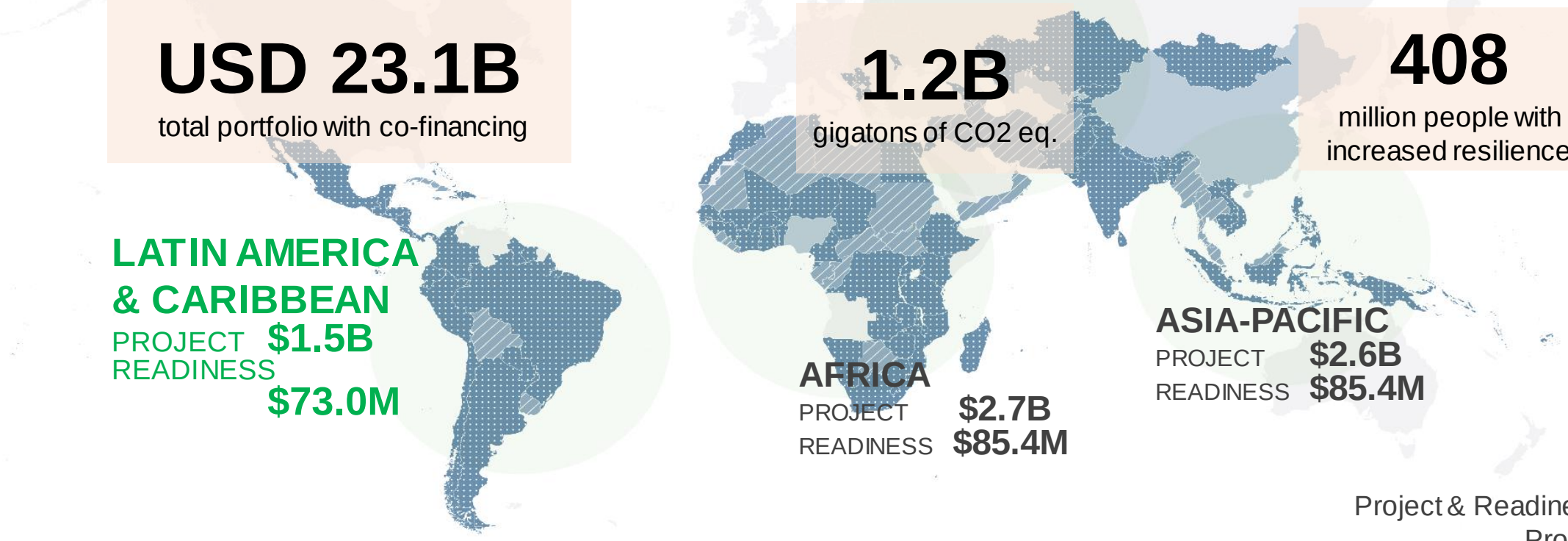
TOTAL
PROJECT **$7.2B** **117 countries**
READINESS **$276M 138 countries**

EASTERN EUROPE
PROJECT **$0.4B**
READINESS **$23.8M**

USD 23.1B
total portfolio with co-financing

1.2B
gigatons of CO2 eq.

408
million people with increased resilience



LATIN AMERICA & CARIBBEAN
PROJECT **$1.5B**
READINESS **$73.0M**

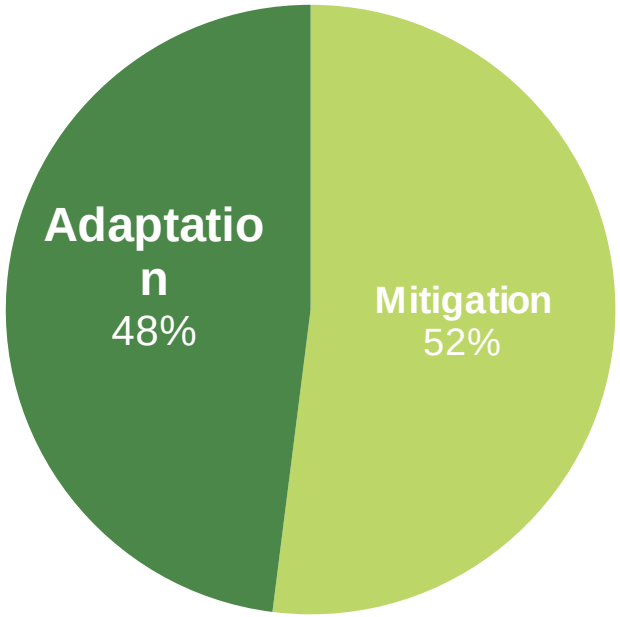
AFRICA
PROJECT **$2.7B**
READINESS **$85.4M**

ASIA-PACIFIC
PROJECT **$2.6B**
READINESS **$85.4M**

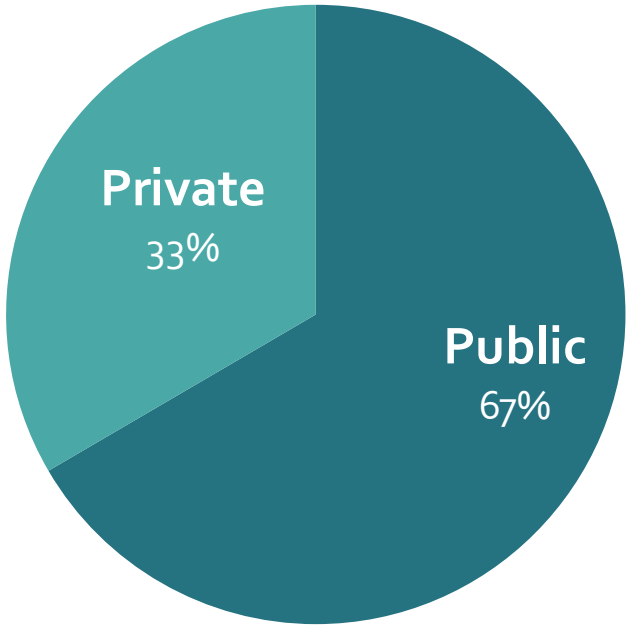
Project & Readiness/PPF
Project only
Readiness/PPF only

GCF PORTFOLIO COMPOSITION

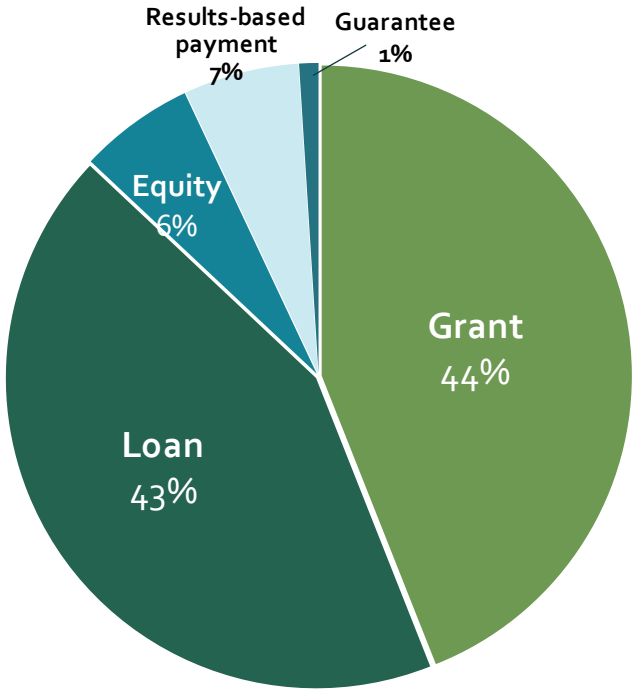
Thematic Area
(Grant equivalent terms)



Public / private sector

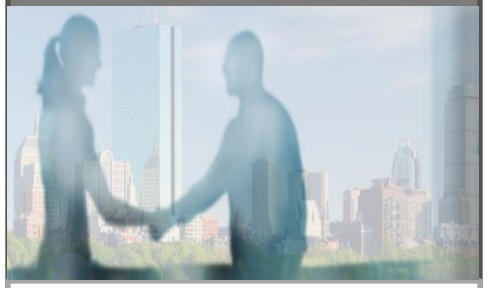


By Instrument (%)



Flexibility in deployment: mitigation/adaptation, public/private, and financial instruments

PRIVATE SECTOR – FOCUS AREAS



Climate Funds

- Mobilize equity investment for climate through funds
- Deployment of funds with strong country ownership
- Promote finance for innovation across sectors

Financial Institutions

- Green lending and risk-sharing through FIs
- Create and support green banks and FI units
- Help mainstream climate change in the financial sector

Project Finance

- Life cycle financing for high impact projects
- Transformative and replicable investments at scale
- Promotion of market changing business models

Climate Markets

- Develop capital and carbon markets for impact
- Structured financing solutions at scale
- Mobilize institutional investment for new markets

Climate Technology & Innovation

- Investments in transformative climate technologies
- Support for local innovation and market accelerators
- Special projects

Five areas of practice to maximize mobilization and impact

GCF INVESTMENTS IN CIEWS

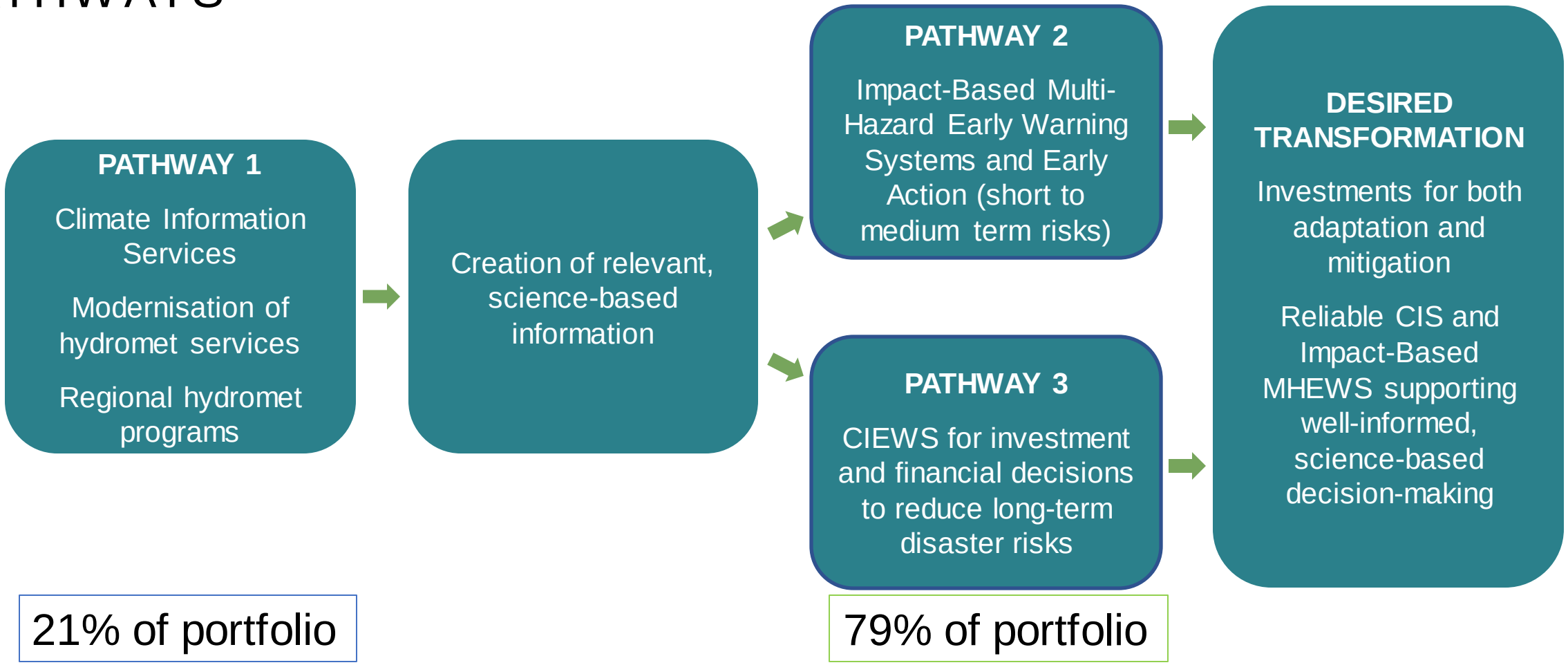
To date, **GCF funding** committed to CIEWS projects exceeds USD 1.8 billion, with co-financing of over USD 2.2 billion.

The **distribution** varies across regions and country groupings. Asia Pacific 44%, Africa 34%; Latin America & Caribbean 20%; Eastern Europe 2%.

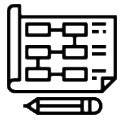
International entities continue to dominate the CIEWS portfolio, receiving about 94% of total GCF resources.

21 % of projects focus on **modernization of hydromet services** and 79% focus on **sector applications (result areas)**

CONCEPTUAL FRAMEWORK OF THE PARADIGM-SHIFTING PATHWAYS



KEY PARADIGM-SHIFTING CONSIDERATIONS TO ENSURE SUSTAINABILITY OF INVESTMENTS



Transformational planning and programming

- Climate science informs strategic plans and country programming; implementation aimed at coherence and complementarity, efficiency and effectiveness.

Catalyzing climate innovation

- Innovations in GFCS, GBON, IBF, FBF, (IoT, Big Data, Cloud Computing) to underpin project design, create strategic partnerships, quality management and improve policy.

Mobilizing investment at scale

- Innovative financing options, enable blended finance and key partnerships to leverage and scale up investments

Expansion and replication of knowledge

- Knowledge brokering on climate investments, science and technology through institutional collaboration; monitoring, evaluation and learning to ensure impact evaluation

Synergetic action between government and private sector, enabled and facilitated by GCF

SAFEGUARDING RURAL COMMUNITIES AND THEIR PHYSICAL ASSETS FROM CLIMATE INDUCED DISASTERS IN TIMOR LESTE

Country	GCF financing	Accredited entity	Financial instrument	Year approved
Timo-Leste	USD 22.36 million	UNDP	Grant	2018

- **Impact-based Multi-hazard EWS for climate resilient rural infrastructure planning & management**
  - Forecasting, risk modeling, communication & response

- **Climate risk reduction & risk-proofing measures for strengthening resilience of small-scale rural infrastructure**
  - 47 slope stabilization projects (216.94 km)
  - 38 enhanced water supply systems
  - 25 improved irrigation systems (54.18km)
  - 20 flood defenses (14.15 km)
  - 300 ha of agroforestry and reforestation

Thank You!

www.greenclimate.fund

#EO4Impact

Markus Repnik is an international development executive with 30 years of experience gained with the United Nations, World Bank Group, Austrian Government, NGOs and private sector, including 16 years field experience in developing and transition countries.

Since October 2017, Mr. Repnik is Director of Development Partnerships at the WMO. His office aims at increasing WMO's country-level impact through strategic partnerships and mechanisms, such as the Alliance for Hydromet Development and the Systematic Observations Financing Facility.

Prior to joining WMO Mr. Repnik was Managing Director of the Global Mechanism, the operational arm of the United Nations Convention to Combat Desertification (UNCCD). Mr. Repnik worked 15 years at the World Bank Group, including 10 years as a manager. As country manager he was responsible for the Bank's engagement with several African and European countries. Mr. Repnik holds a Master of Economics and Social Sciences.

Markus Repnik
WMO Director Development Partnerships

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Systematic Observations Financing Facility Innovating finance to support sustained international exchange of foundational weather and climate observations

Markus Repnik, WMO Director Development Partnerships

23 September 2021

GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

The problem – missing foundational surface-based observations

Surface-based observations crucial for weather and climate prediction are not being collected and internationally shared in many parts of the world

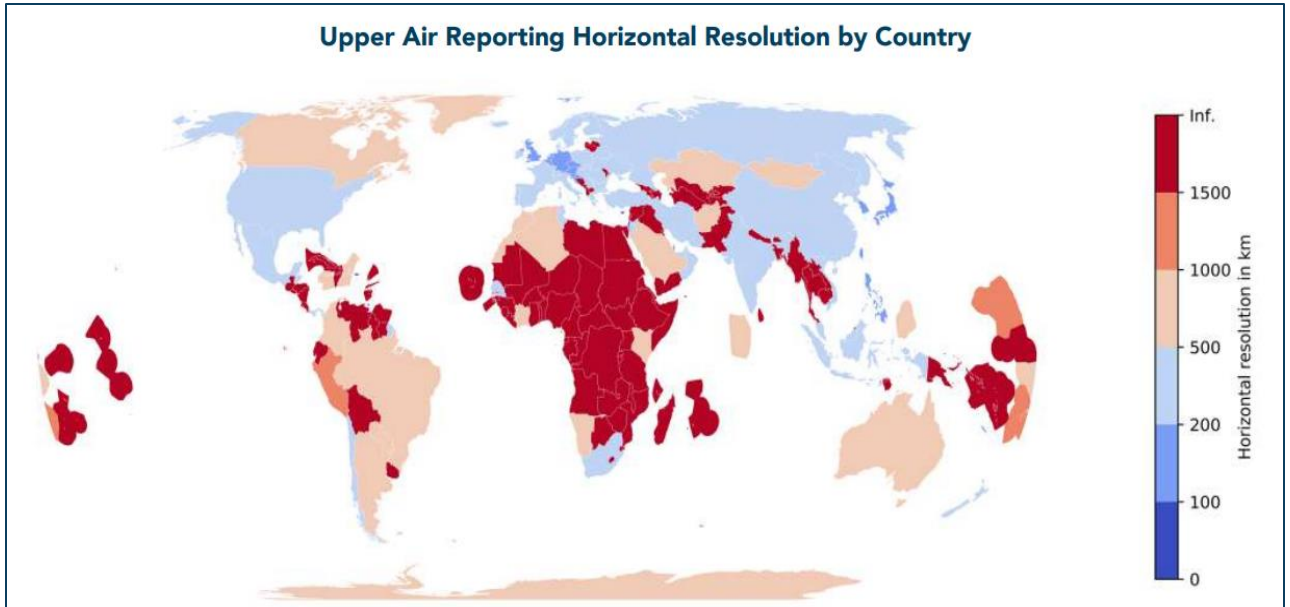


Figure 3 This map shows the horizontal resolution of upper air observations in different countries based on stations actively reporting in January 2020. *Source: WMO Secretariat.*

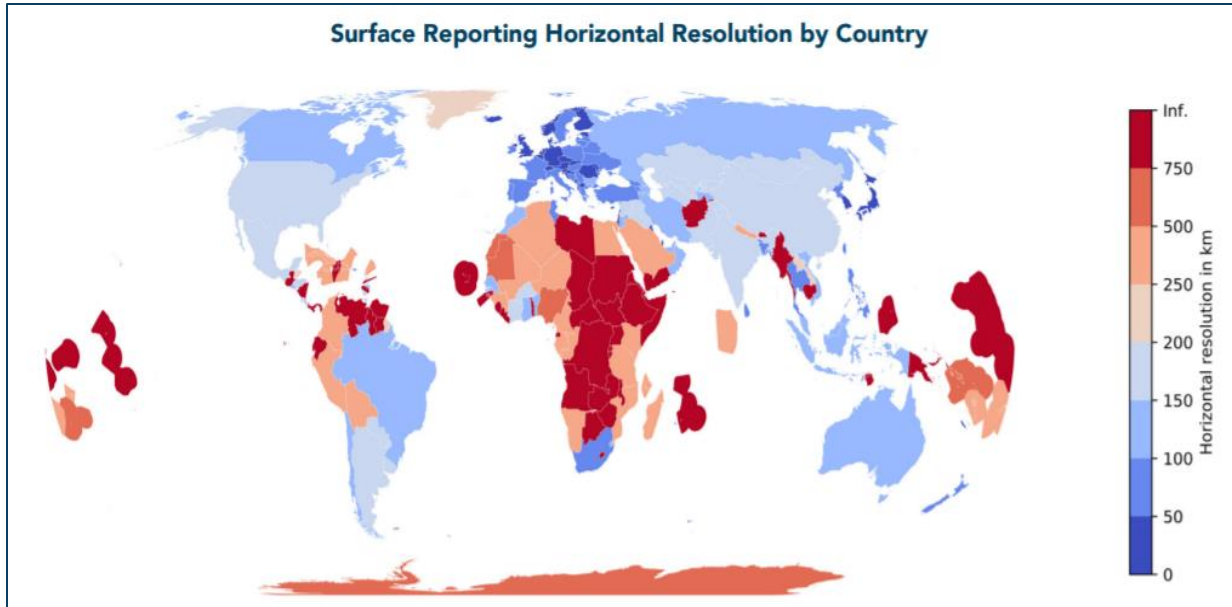


Figure 2 This map shows the horizontal resolution of surface observations in different countries based on stations actively reporting in January 2020. *Source: WMO Secretariat.*

Slide 27

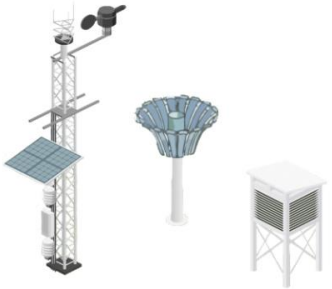
The role of surface-based observations

- Essential for weather and climate prediction models
- Measure weather and climate variables that cannot be reliably observed from space
- Play a vital role in the anchoring, calibration and validation of satellite data

Variable	Source(s)	Details
Wind (two components)	Surface- and space-based	Space-based: Horizontal coverage Surface-based: Vertical structure
Temperature	Surface- and space-based	Space-based: Horizontal/ vertical coverage Surface-based: Detailed vertical structure
Humidity (water vapor concentration)	Surface- and space-based	Space-based: Horizontal/ vertical coverage Surface-based: Detailed vertical structure
Surface atmospheric pressure	Surface-based	Surface-based only (not measured from space)

Surface-based observations and satellites

- Satellites provide excellent data coverage but cannot alone meet the observational needs of Numerical Weather Prediction (NWP)
- Satellite observations help ensure a realistic model representation but cannot verify forecasts of surface weather
- Without the exchange of surface-based observations, the rest of the meteorological value chain has an inadequate base to build on



Surface land-based observations

Upper-air land-based observations

Slide 29

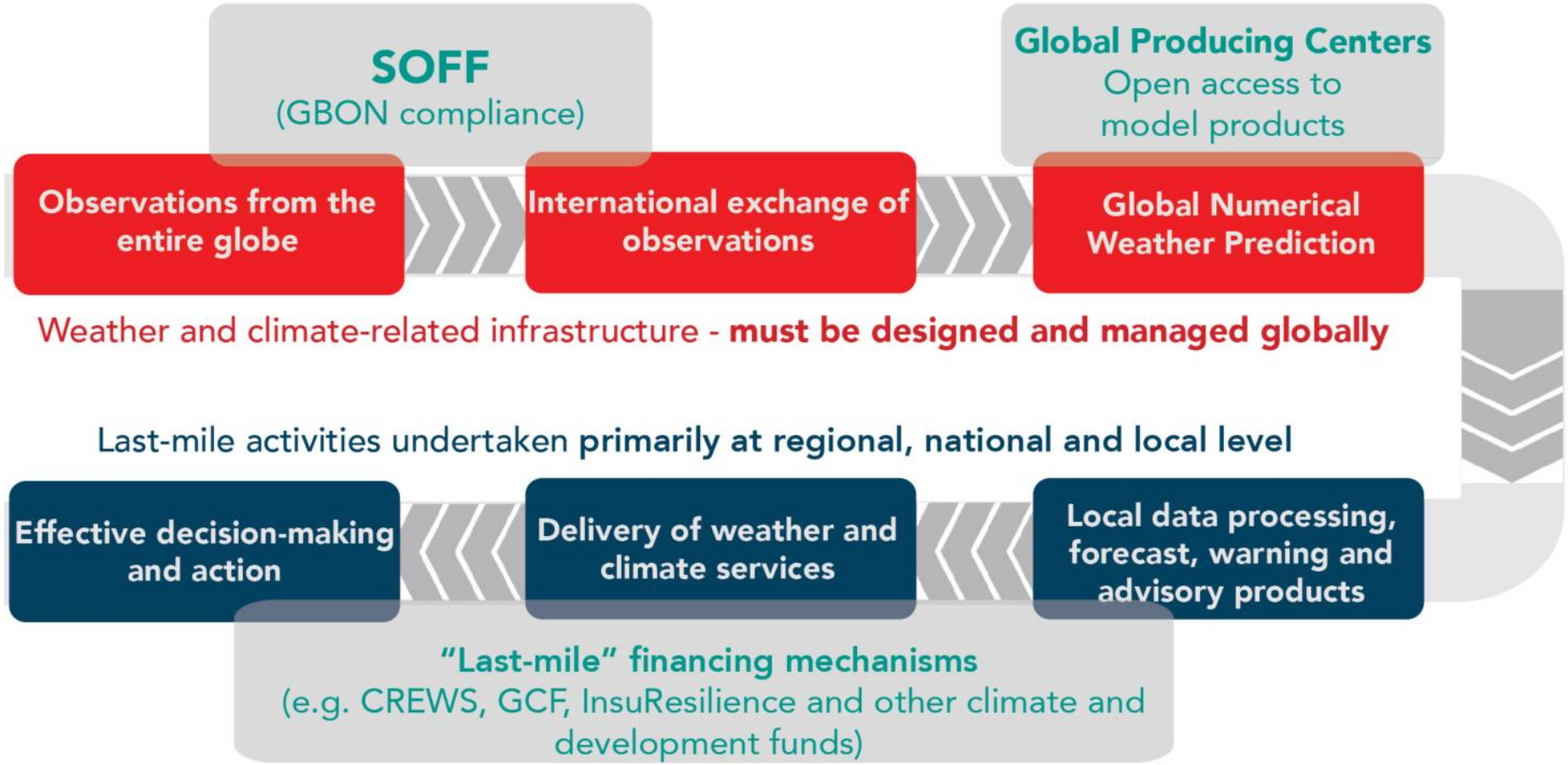
The Global Basic Observing Network (GBON)

- A global "optimal" design to address the observational coverage gaps
- To ensure a reliable supply of observational data and respond to the most essential data requirements of weather and climate prediction models
- Agreed by 193 WMO Member countries and territories
- Clear requirements for all countries to collect and internationally exchange the most essential surface-based weather data
- Based on the principle of global free and unrestricted data sharing

What is the Systematic Observation Financing Facility (SOFF)?

- A new mechanism to ensure long-term generation and international exchange of basic surface-based weather and climate observations
- SOFF will provide grants and technical assistance to countries with the largest capacity gaps – priority Small Islands Developing States and Least Developed Countries
- An initiative with an exclusive focus on the initial part of the meteorological value chain that creates the foundation for effective weather and climate information services policy and investment decisions
- Created as a "UN coalition Fund (WMO, UNDP, UNEP)" to address a foundational problem in a systematic manner

SOFF and the meteorological value chain



SOFF innovative features

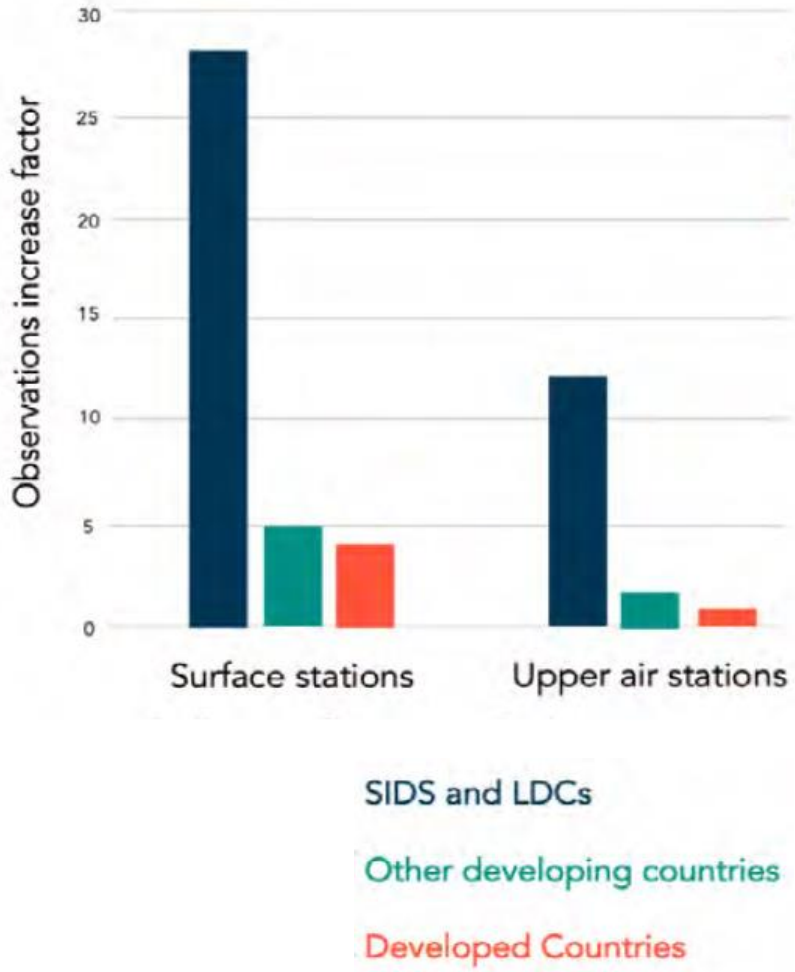
- **Provision of innovative finance**
  - Long-term predictable grant finance for a global public good
  - Finance for operations and maintenance
  - Results-based finance

- **Global approach with sustained data exchange as measure of success**
  - GBON metrics to guide investments and focus on long term compliance
  - Unified investment approach to close GBON gap

- **Enhancement of technical competency and coordination**
  - GBON-specialized peer-to-peer technical support
  - Effective collaboration and coordination among the main stakeholders and partners

SOFF benefits

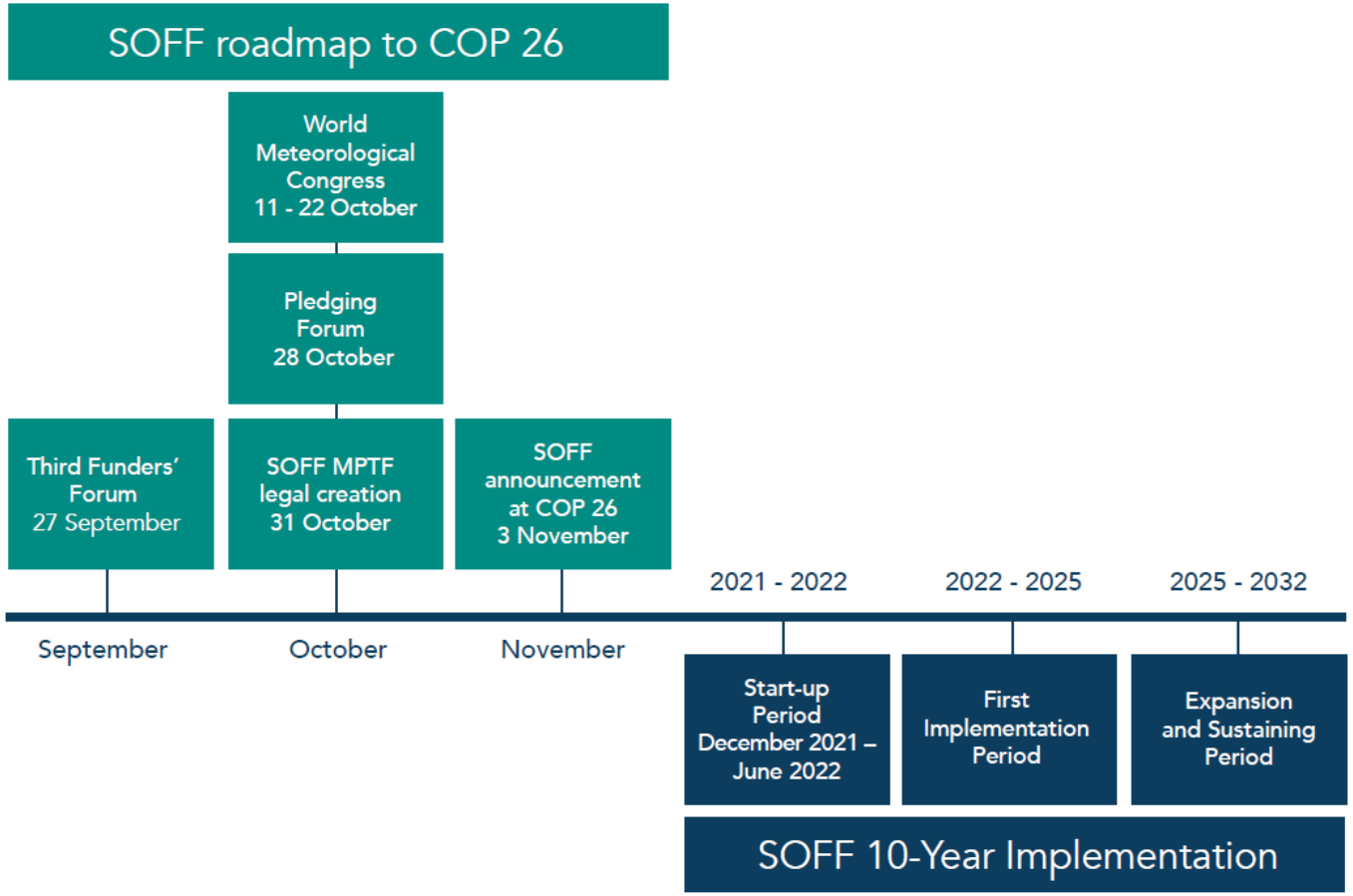
- SOFF will generate an increase of surface observations by **28 times** and upper air observations by **12 times** in **SIDS and LDCs**
- Benefits from filling the gaps in these countries exceed **USD 5 billion per year**
- Weather and climate observations are essential to fully realize the **USD 162 billion** of estimated minimum annual socio-economic benefits of weather and climate prediction



The value of SOFF for climate finance

- SOFF provides the foundation for effective climate finance for adaptation and mitigation – strong science basis
- More efficient allocation of resources – guided by GBON requirements and based on hydromet value chain assessments – Country Hydromet Diagnostics
- Coordinated global approach – vs fragmented modus operandi of the many actors active in this space
- Inclusive governance structure incl. climate finance and earth observations partners: GEO part of SOFF advisory board

SOFF roadmap to COP 26 and beyond



Thank You!

Markus Repnik
mrepnik@wmo.int
https://alliancehydromet.org/

23 September 2021

#EO4Impact

Dr. Einar Bjørgo is Director of the UN Satellite Centre (UNOSAT) at the United Nations Institute for Training and Research (UNITAR).

He joined the UN High Commissioner for Refugees (UNHCR) in 1999 working on integrating new technological solutions into its operations, with special focus on use of satellite imagery. In 2002 he joined UNOSAT and has in this capacity ensured satellite image analysis is made timely available in support to humanitarian relief, sustainable development, environment, climate services, peace & security, human rights and international law, all key components of the Sustainable Development Goals. Through UNOSAT knowledge-transfer mechanisms he also supports beneficiaries from UN Member States, regional organizations, sister agencies and NGOs with training and capacity development on geo-spatial technologies.

As of January 2018, he also oversees UNITAR's Strategic Implementation of the 2030 Agenda Unit with a focus on integrated policy development, data and innovation in support of strengthening capacities of UN member states. He is part of the Scientific Advisory Board at the Office of the Prosecutor, International Criminal Court.

Einar Bjørgo
Director of UN Satellite Centre (UNOSAT)
United Nations Institute Training and Research

Mr. Unnikrishnan Divakaran Nair is the Head of Climate Change at the Commonwealth Secretariat. Before joining the Commonwealth, he led the Global Green Growth Institute(GGGI) India and was responsible for facilitating the strategic delivery and execution of GGGI initiatives in country. Prior to that, he served the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat in Bonn as the officer responsible for the climate finance and National Adaptation Plans (NAP) process for Least Developed Countries (LDCs). Unnikrishnan also had a long stint with GIZ India, as Senior Adviser, managing the climate finance and natural resource management vertical under Indo-German bilateral cooperation.

Unnikrishnan has over 20 years of experience in the areas of Climate Change Adaptation & Mitigation, Project Development and Implementation, Policies on Climate Finance, International Accreditation to Climate Funds including the Green Climate Fund (GCF) and expertise in climate vulnerability and livelihood issues in Agriculture, Water and Forestry in the Rural Development context of India and LDCs. He has worked with a range of organizations from the civil society to community-based organizations to private sector, bilateral and multilateral agencies.

Unnikrishnan Nair

Head of Climate Change
The Commonwealth Secretariat

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Supporting Improved Access to Climate Finance in Pacific SIDS: CommonSensing Approach

Einar Bjørgo, Director of UN Satellite Centre (UNOSAT), UNITAR
Unnikrishnan Nair, Head of Climate Change, The Commonwealth Secretariat

23 September 2021

GROUP ON EARTH OBSERVATIONS

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CommonSensing approach

UNOSAT leads the CommonSensing, with the support of UK Space Agency and NORAD, that aims to enhance climate resilience and strategic development for vulnerable countries in Asia-Pacific and Africa using satellite-based remote sensing solutions.

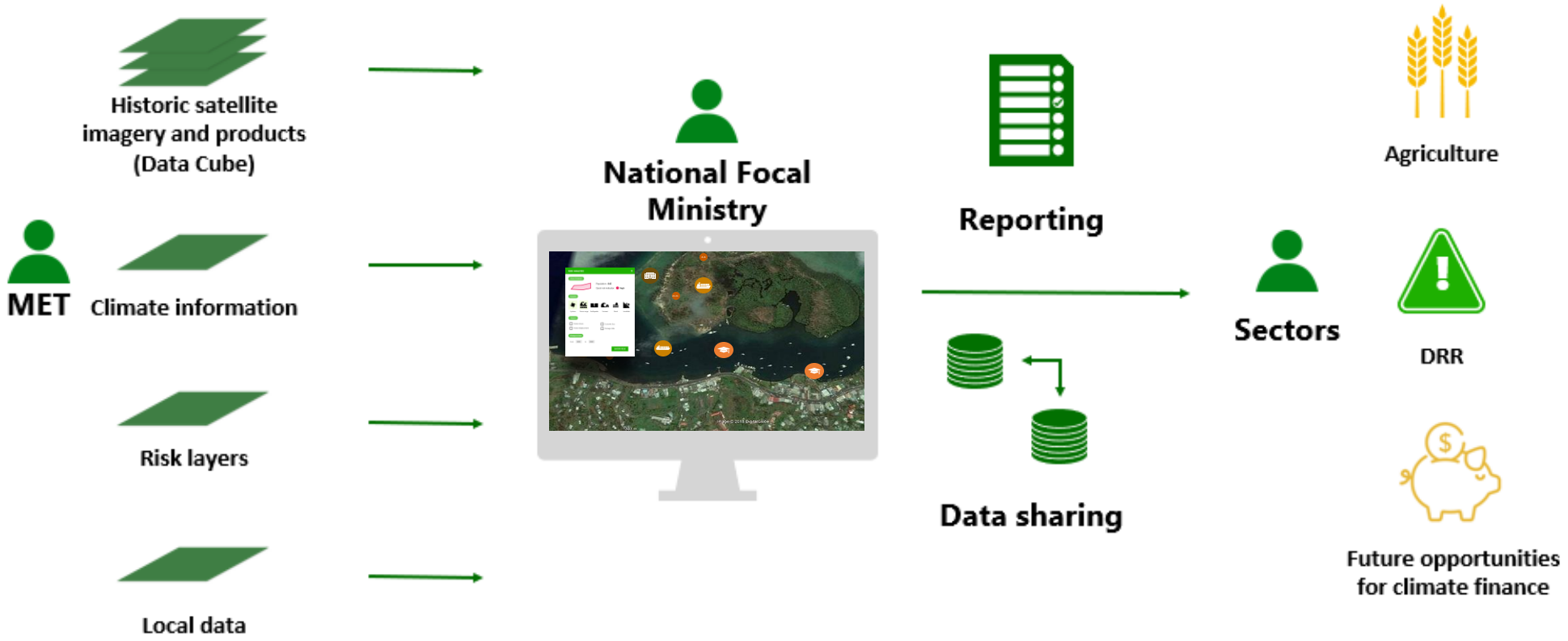
CommonSensing for the Pacific SIDS is consisted of 1) Technical Platform and Data Cubes containing information on 4 thematic areas, and 2) Capacity Development activities, such as training, technical backstopping and awareness-raising events.

Challenges faced by small island nations in using GIT and EO data to strengthen evidence-based decision making

- **Scattered information** with no central point for data sharing facilitation
- **Costs** for advanced GIS tool and high-resolution satellite imagery
- **Lack of national capacity** for using GIT applications and accessing, analyzing, and visualizing satellite data

Technical Platform and Data

"Geospatial and Climate Information Tools for Evidence-based Decision Making"



Benefits:

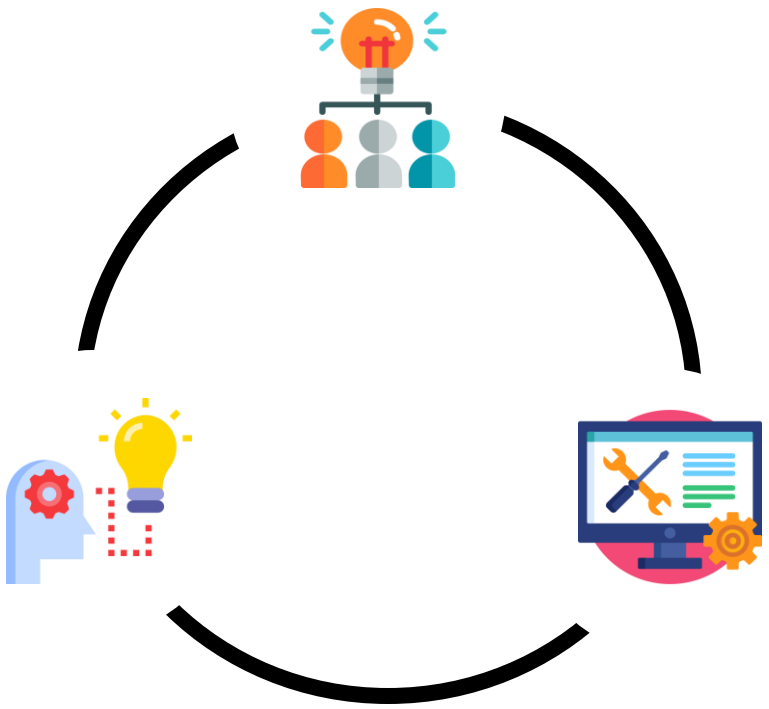
- Access to current information
- Access to historic information
- Building understanding of future climate and risks

End-users:

- Technical experts
- Sectoral experts
- Decision makers
- Secondary regional users

> ***The CS Platform is a fantastic resource and includes a broad spectrum of useful and relevant data sets.*** *It has high potential to be extremely useful for numerous applications,* ***including Climate Finance proposals****. Risk Information Application and Decision support is already highly intuitive, and it is clear how it can be usefully applied. Application of some of the Data Cube products require expertise.*
>
> *Anonymous test user in Fiji*

Capacity Development



<u>"Development of Institutional Capacity in the Use of GIT Applications"</u>

Activity Types:

- Awareness raising
- Technical training
- Technical cooperation

Target Groups:

- Technical staff
- Specialised analysts
- Decision makers

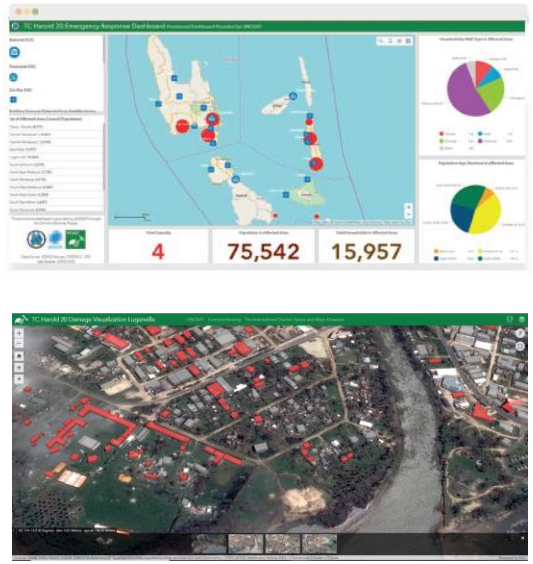
Fostering Evidenced-based Decision Making by Transforming Satellite Data into Actionable Insights

Disaster Risk Management

- **Natural hazards (tropical cyclone, flood, landslide)**
- **Covid-19 preparedness**
- **Sea-level rise and human mobility**
- **Protection of World Heritage Sites (oil spill, illegal logging)**

Access to Climate Funds

- **Fiji Rural Electrification Fund (FREF)**
- **Climate Change Relocation (CCR)**
- **Decarbonization of public bus transport in Fiji (E-bus)**



Tsunami Evacuation Maps & Monitoring of Illegal Logging (Solomon Islands)

TC Harold Response Dashboard & 3D WebMap for Recovery Planning (Vanuatu)

Accessing & Using EO data in Climate Finance Applications: An Untapped Potential

- **There is significant scope to improve access to and use of EO data in accessing climate finance concept notes / proposals.**
- **Most effective: EO data used alongside other data sets and applications.**
- **Can support variety of sectoral project proposals OR proposals can be aimed at improving access, use and application of EO data and related applications/tools.**

Thank You!

Einar Bjørgo II einar.bjorgo@unitar.org II @unosat
Unnikrishnan Nair II u.nair@commonwealth.int II @commonwealthsec

23 September 2021

#EO4Impact

John has nearly 30 years' experience in assessing the impacts of climate change. He has a particular expertise in the impacts of climate change on SMEs, multi-national corporates and their supply-chains and the financial services sectors (risks and opportunities); and is actively engaged on work related to the 'Task Force on Climate-related Financial Disclosures' (TCFD). He has worked extensively on country National Adaptation Plans developing the linkages between non-state actors, government and politicians to create shared agendas for policy reform. His interests include the legal implications for business, disclosure of information to investors, the mobilisation of private-sector finance, climate funding in developing countries, and the integration of adaptation/resilience into national policy making. He has a particular interest in the value of Earth Observation data and its use by the financial services and business sectors to assess climate risk and opportunities to adapt and build resilience.

John has worked on projects in Europe, Africa, North America, Latin America and the Caribbean, the Indian Ocean, the Middle East, Australia, South and South-East Asia for banks, governments, insurers, investors, development partners, and the private sector.

He was previously the co-founder and CEO of Acclimatise, which was acquired by Willis Towers Watson in November 2020.

John Firth
Senior Director
Willis Towers Watson

Open discussion

Guiding questions:

1. How can EO support better access to climate finance by developing countries?

2. How can the GEO community contribute to ongoing or new initiatives?

Short break

See you in 6 minutes

Session 2

EO in support of private climate finance

Antoine Bavandi is a senior risk finance specialist with the Crisis and Disaster Risk Finance team at The World Bank. In this role, he advises developing countries on designing and implementing disaster risk financing and insurance solutions through analytical work and policy dialogue. Key activities include developing customized financial products with Ministries of Finance to strengthen financial resilience to climate, crisis and disaster risks. A catastrophe risk modeling and management expert, Antoine has worked at Lloyd's of London, Allianz Global Corporate & Specialty and the European Space Agency. He holds degrees from École Centrale, Imperial College and Stanford University.

Antoine Bavandi

Senior Risk Finance Specialist,
Crisis and Disaster Risk Finance team,
The World Bank

GEO CLIMATE POLICY AND FINANCE WORKSHOP

EO for Climate Risk Finance

Antoine Bavandi, The World Bank

23 September 2021

GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

WBG Agenda on Climate Change

- ✓ **WBG Climate Change Action Plan 2021-25**
  Supporting Green, Resilient, and Inclusive Development:
  - 35% of WBG financing with climate co-benefits, of which at least 50% for adaptation and resilience
  - Improving and expanding climate diagnostics and analytics (Country Climate and Development Reports)
- ✓ **IDA20**
  - Building Back Better from the Crisis: Towards a Green, Resilient and Inclusive Future.
  - Climate change as one of the special themes

An estimated $400-600 billion per annum is needed to finance conservation of land, forests and water – to fund projects in renewable energy and energy efficiency.

WBG Finance for Green and Resilient Growth

Disclosure & Reporting

- **Taxonomies and reporting standards** to support transparency for climate-risk informed investments.

Risk Management

- **Climate risk finance instruments** to protect households, businesses and governments against climate shocks and disasters
- **Prudential regulations** to manage risk, increase financial stability, and incentivize greener investments

Green Finance

- **Green financial instruments** (e.g., green bonds, green housing finance) allow for investment which have a positive climate impact as well as generate financial return

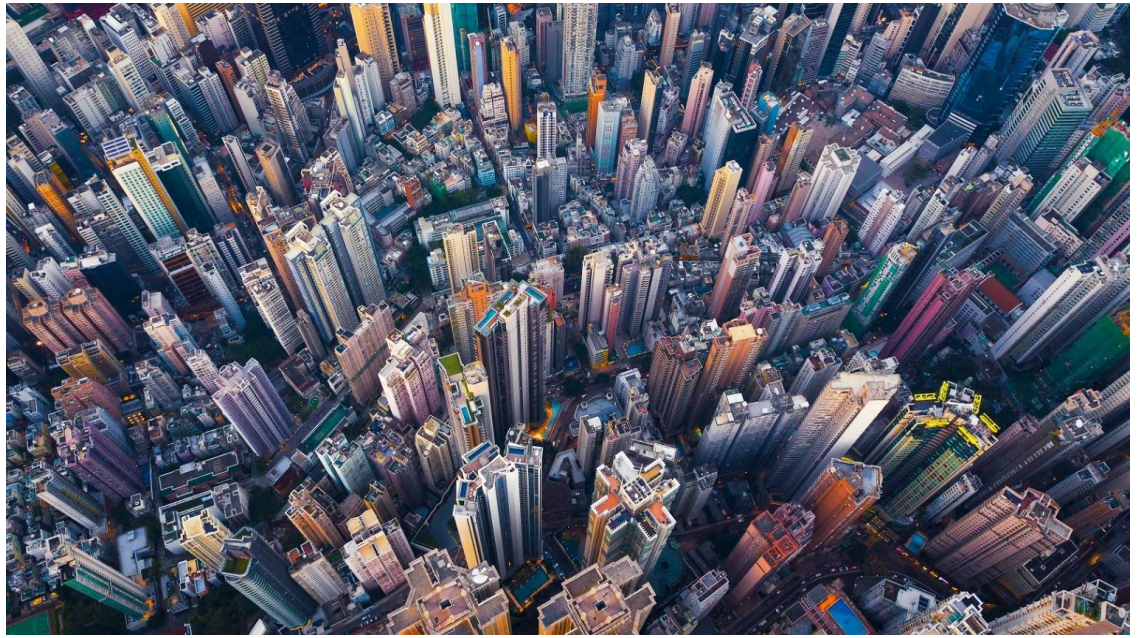
Analytical & Advisory Services (FSAPs, Climate and Disaster Risk Finance Diagnostics)

Global Discussions (e.g., FSB, TCFD, NGFS, G7, G20, InsuResilience Global Partnership)

Lending

Disclosure & Reporting

- ✓ **Climate-related disclosure has limitations**
  - Data coverage is incomplete
  - Lack of standardization and not always adapted to developing countries
  - Limited investors' awareness of those limitations and of actual risks and opportunities
- ✓ **Task Force on Climate-related Financial Disclosure (TCFD)**
  - Game-changer in disclosure on risk and opportunity
  - Promoting transparent reporting of forward-looking, systemic climate risk



ESG data is critical to inform investments through forward looking and physical impact assessment, including through granular exposure and robust climate risk indicators

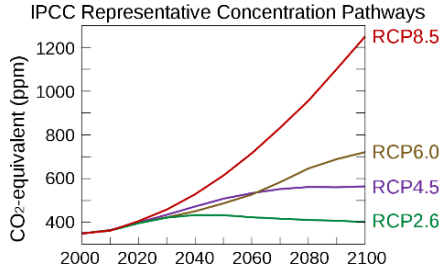
Need for comprehensive, open, transparent climate data reporting framework in developing countries

Climate Physical Risk Assessment

Leveraging EO and Big Data to better understand direct & indirect costs of extreme climate events (drought, flood, heatwaves) at sectoral level and for the financial sector

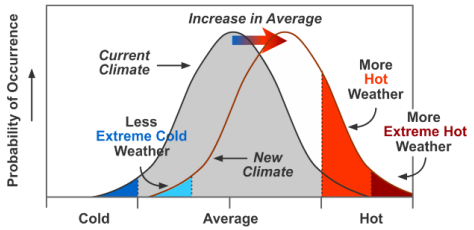
Example of World Bank technical assistance activity for the Moroccan Central Bank on Climate Physical Risk Assessment based on forward-looking scenarios

High-res EO-based financial exposure mapping of Rabat

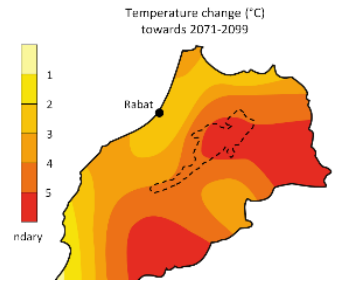


RCP Projections

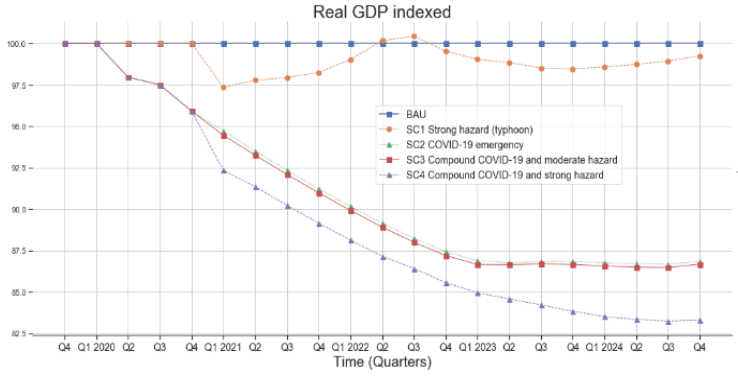
Climate Change Environment by 2030



Climate Scenarios



Macro-Financial Impacts



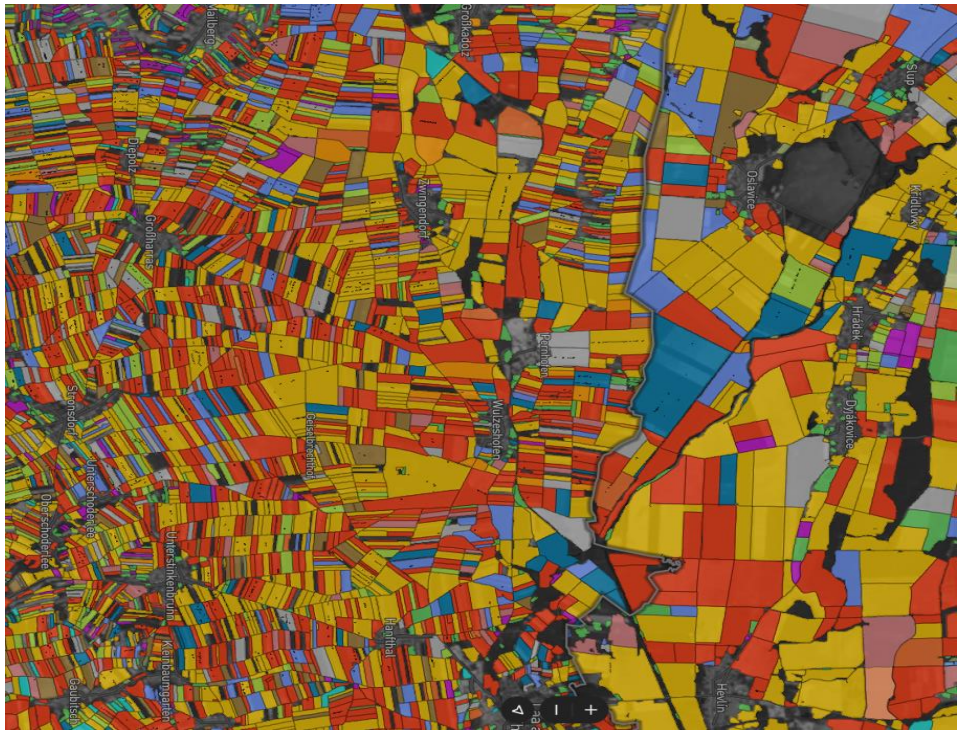
Stress-test & Impact on banking sector (e.g. credit risk)

Joint partnership with ESA on Innovative Analytics for Improved Risk Financing

- Forecast and near real-time risk information
- Risk models and triggers for “new” risks
- Exposure mapping
- Improved parametric insurance products
- Capacity Building on use of EO/Big Data, AI/ML

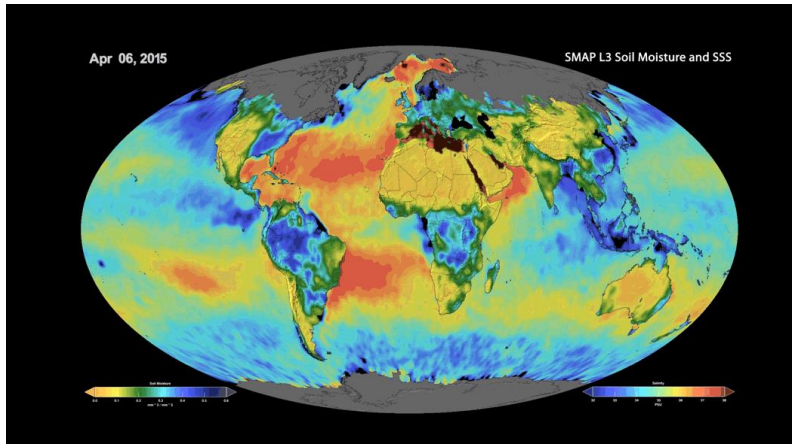
Disaster Risk Financing & Insurance Program
SUPPORTED BY WORLD BANK GROUP

esa

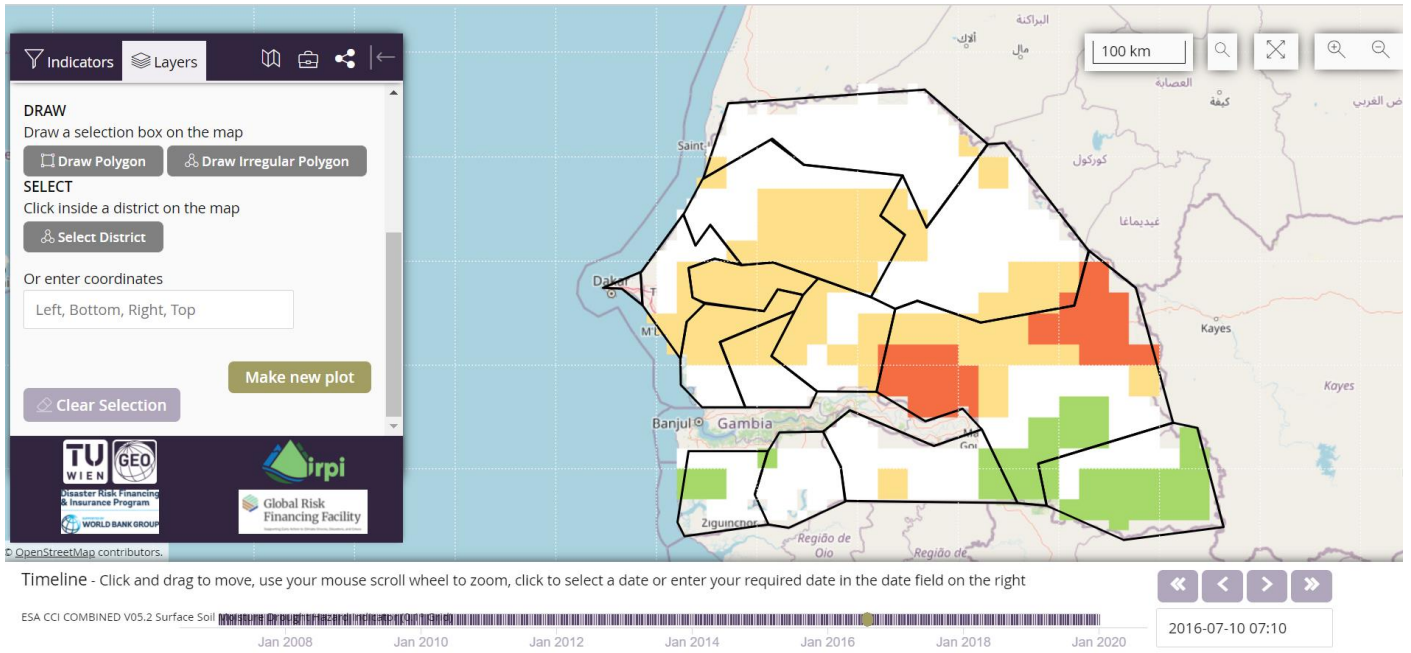


Leveraging our partnership with ESA and the Global Development Assistance program to integrate value-add EO-based risk information into demand-driven risk financing applications in developing countries

Leveraging satellite data for drought insurance in Senegal

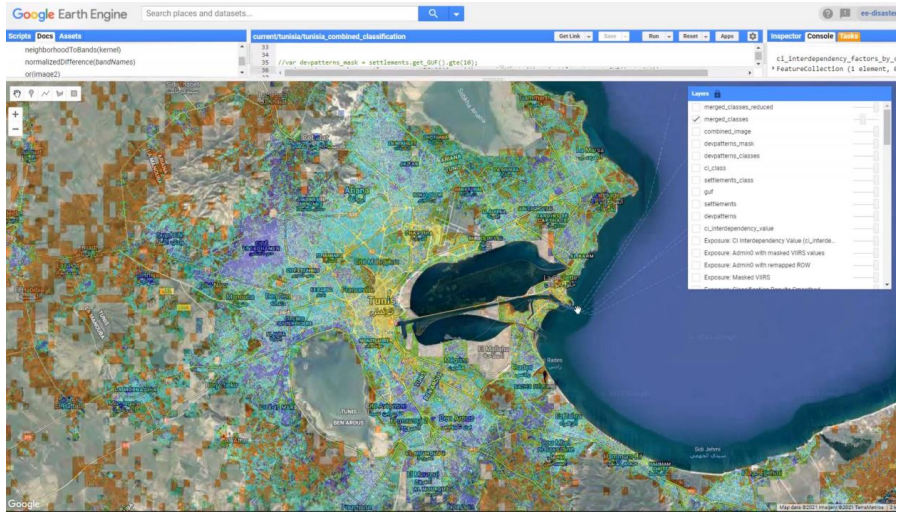


Satellite-based soil moisture provides unique insight into drought risk through continuous, global coverage with the Copernicus constellation (source: ESA/SMAP)



esa
Global Index Insurance Facility
MANAGED BY WORLD BANK GROUP
Global Risk Financing Facility
Supporting Early Action to Climate Shocks, Disasters, and Crises
IRI International Research Institute for Climate and Society
EARTH INSTITUTE | COLUMBIA UNIVERSITY
TU WIEN GEO

EO-based mapping of financial exposure in Tunisia



Mapping built environment through a combination of satellite and Google-Earth imagery data, and trained AI/ML, to disaggregate Tunisia's exposure database down to sub-commune level, and by structural type, occupancy type, age, number of stories

ID	Lateral Force-Resisting System (LFRS)	Description
1	Maçonnerie en pierre non armée	Unreinforced Masonry (URM), Stone
2	Maçonnerie en brique non armée	URM Fired Brick
3	Maçonnerie fragile	Fragile Masonry
4	Maçonnerie chainée	Confined Masonry
5	Structure en béton armé	Reinforced Concrete with URM
6	Structure en acier	Steel Frame with URM
7	Structure en béton armé double	Engineered, RC Frame

Global Risk Financing Facility
Supporting Early Action to Climate Shocks, Disasters, and Crises

Leveraging Earth Observation Data

Disclosure & Reporting	Risk Management	Green Finance
• **Climate-risk indicators for ESG and Climate Investing**: subset of Essential Climate Variables (ECV) that are simple and easy to use operationally in developing countries.	• **Support climate physical risk assessment through** (i) financial sectoral exposure mapping (ii) EO-based risk mapping and modelling (e.g., flood extent maps) supported by increased computing capacity and improved modelling of physical systems.	• **Support provision of climate impact indicators** (e.g., GHGSat emissions monitoring)

Thank You

Antoine Bavandi / 23 Sep 2021
abavandi@worldbank.org

#EO4Impact

David Carlin leads the TCFD and climate risk program for UNEP- Finance Initiative. He currently is running a pilot for nearly 50 global banks and investors on topics of climate scenarios, climate risk assessments, and climate governance. He is also a contributor to Forbes, where he writes about climate change and leadership.

Prior to joining UNEP-FI, he worked as a senior manager in Risk and Public Policy for Oliver Wyman Consulting and in Model Risk Management for PNC Bank. His background is in quantitative modeling and decision science.

He conducted research in financial decision-making at Carnegie Mellon University and graduated Phi Beta Kappa from Williams College.

David Carlin
Climate Risk Lead
UNEP FI

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Mobilizing the financial sector to confront climate risk

David Carlin, UNEP FI
23 September 2021

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UNEP FI has run TCFD pilots since 2017

They have helped dozens of FIs to implement the TCFD's recommendations

Objectives of UNEP FI's TCFD Programs

Through engagement with experts and collaborative peer interactions, participants improve their climate preparedness

Climate scenarios

- Explore the spectrum of climate scenarios
- Identify scenario differences and key assumptions
- Learn how to use scenarios to assess risks and opportunities
- Identify relevant internal and comparable reference scenarios

Data and methodology

- Determine availability of climate relevant asset-level data
- Advance and refine phase I methodologies for risk and opportunity assessment
- Create a comprehensive risk taxonomy across sectors and geographies
- Develop best-practices around sector/geographical assessments

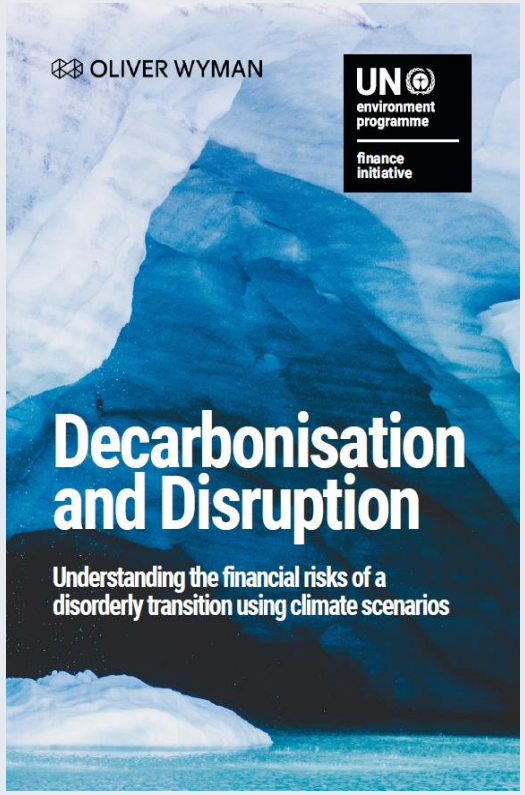
Reporting and governance

- Understand expectations around TCFD disclosures
- Develop approaches to standardize disclosures
- Develop practices for creating an internal climate risk program
- Draft TCFD disclosures

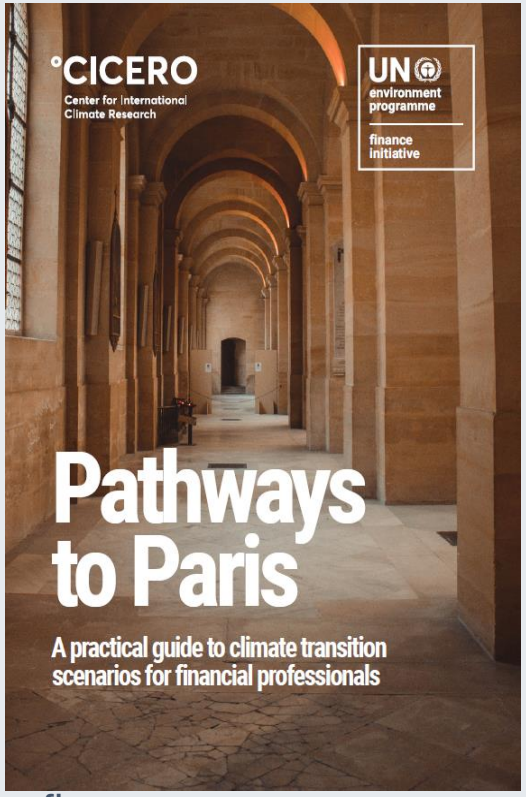
Recent UNEP FI TCFD program releases

These reports provide actionable guidance on climate risk topics for practitioners to advance industry good practices

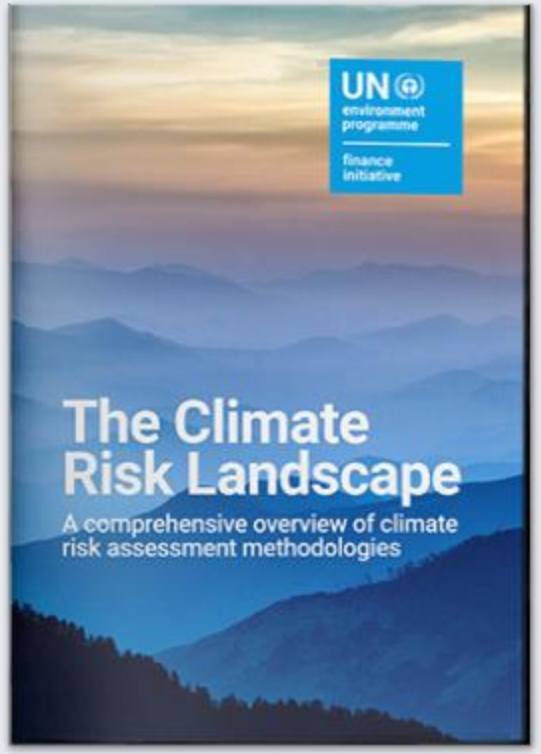
Decarbonisation and Disruption
Sectoral effects of disorderly transition



Pathways to Paris
Primer on transition pathways



The Climate Risk Landscape
Tool and methodology perspectives



Thank You

#EO4Impact

Jelmer works for Rabobank to develop innovative, meaningful and pragmatic solutions in the Food & Agri domain. He is responsible for project Acorn that supports smallholder farmers in the transition to agroforestry supported with additional income from Carbon Removal Units that are verified with the help of remote sensing to allow for scale. As former strategy consultant he has ample experience in bringing strategy into practice. During his period at World Food Programme he experienced farmer needs in developing countries at first hand.

Jelmer van de Mortel
Head of Acorn
Rabobank

Mila is an experienced leader, researcher, and consultant, who has worked within a range of organizations in Europe, USA, Asia and Africa. She has a first-hand experience in start-up environments, where she leads research and innovation, bringing products from concept to market. She manages international teams and helps members adjust to start-up dynamics. She is trained in acquiring project funding on national and international level and actively involved in international accreditation initiatives. She is an expert in infrared spectroscopy and remote sensing (RS) technology for environmental modelling and management.

Mila Luleva

Head of Remote sensing Acorn Rabobank

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Acorn: Unlocking the voluntary carbon markets with remote sensing

Jelmer van de Mortel / Mila Luleva
September 23, 2021

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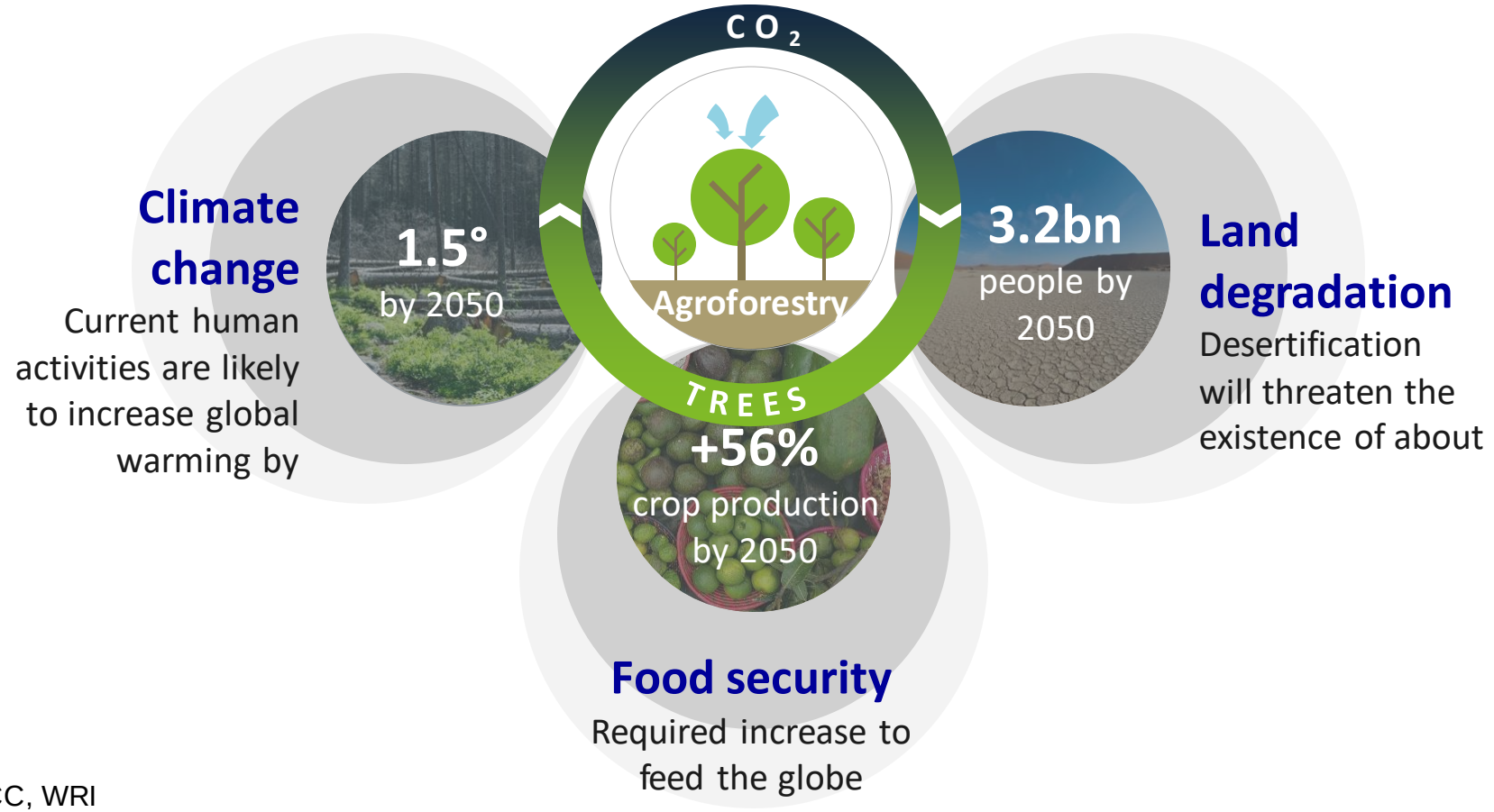
#EO4IMPACT

Our mission is to combat climate change, land degradation and increase food security and improve smallholder farmer livelihoods



Climate change
Current human activities are likely to increase global warming by

Land degradation
Desertification will threaten the existence of about

Food security
Required increase to feed the globe

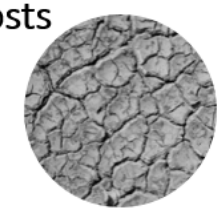
Source: FAO, IPBES, IPCC, WRI

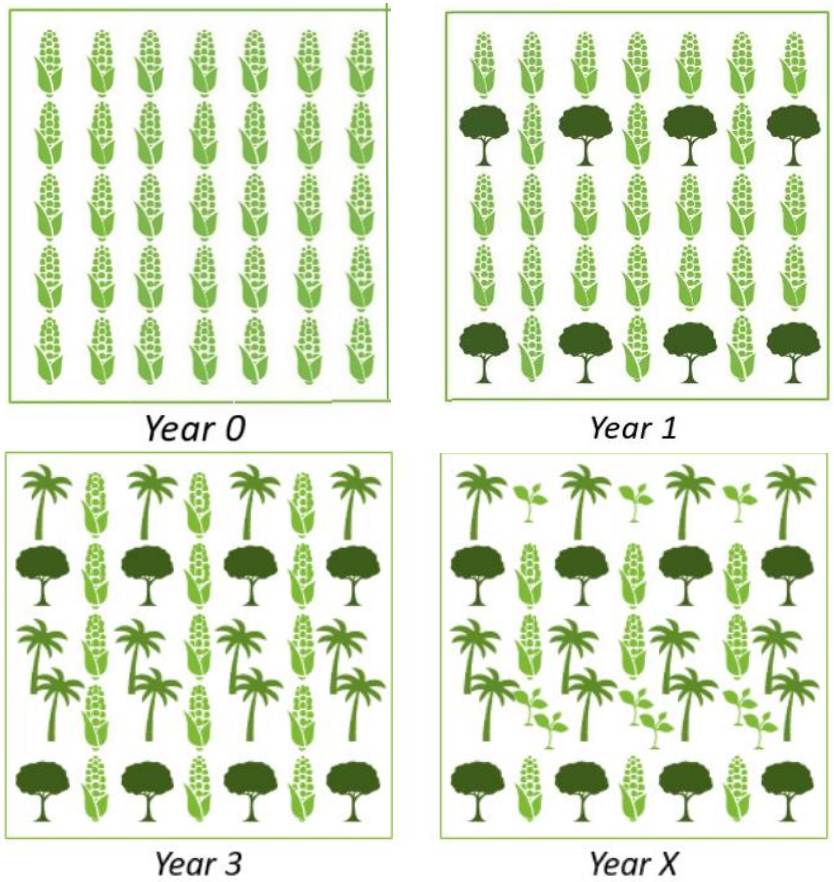
Acorn aims to support smallholder farmers to transition to agroforestry given its versatile benefits

Monoculture agriculture:

- Depleting soil
- Sensitive to climate change
- Low nutrient diversity
- Low yield per ha
- Income depends on single crop type
- Deforestation

Lower investment costs



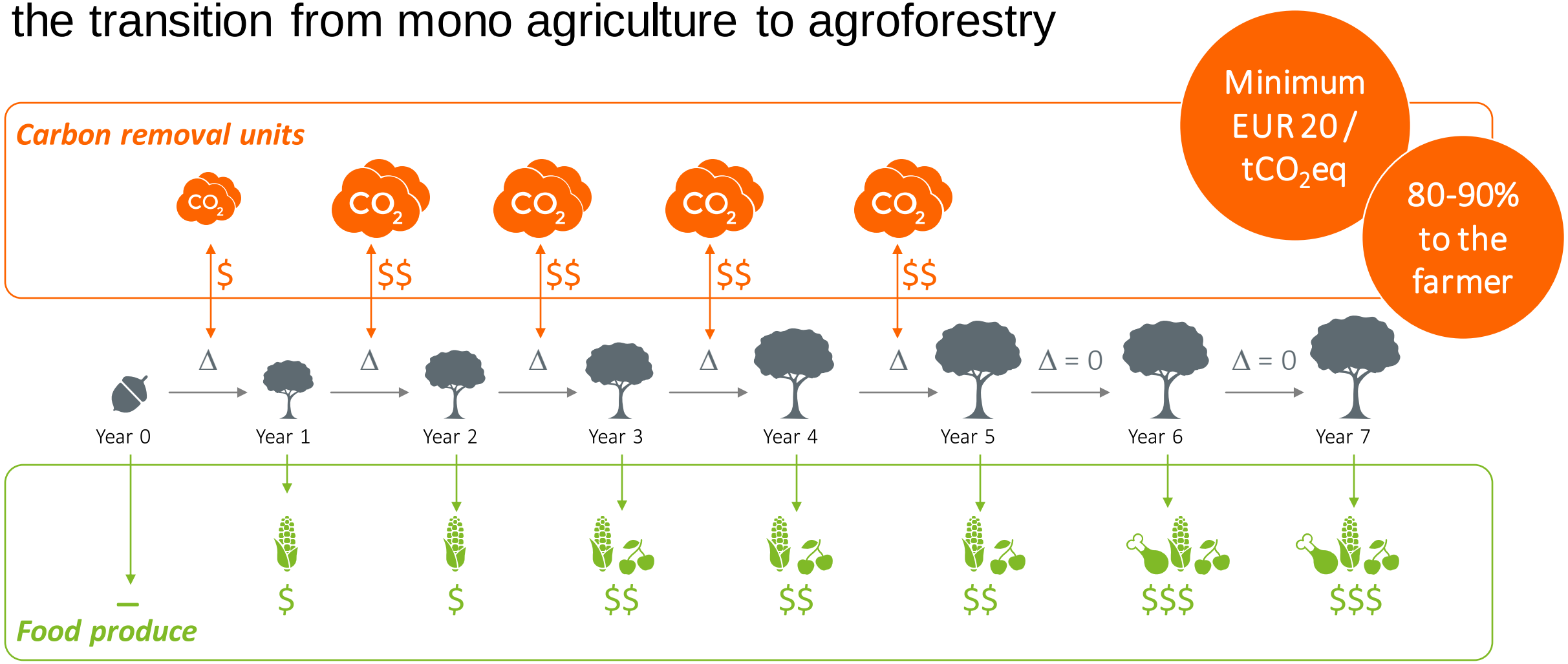


Agroforestry:

- Improving soil health
- Increasing climate change & weather resilience
- Diverse nutrients
- High quality nutrients
- Improved yield per ha
- Income depends on different harvest streams
- Afforestation

Higher investment costs

Annually generated, ex-post Carbon Removal Units serve as financing for the transition from mono agriculture to agroforestry



High entry barriers made it difficult for smallholder farmers to benefit from the carbon market

High monitoring costs throughout the project

need for scalability

High certification costs for each project

need for feasible approach

Therefore, we have built a global, technology-enabled, trusted and transparent marketplace for carbon sequestration

Connecting emitters and off-setters on the marketplace with an ecosystem of partners

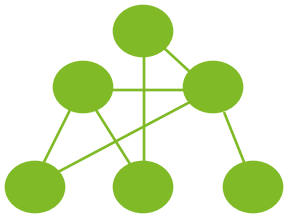
+

Technology-driven monitoring (satellite data, AI and ML) based on historic and current data

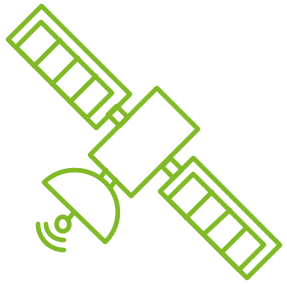
+

High-quality, traceable carbon sequestration built on own standards and project selection

Marketplace & Ecosystem



Technology & Trust

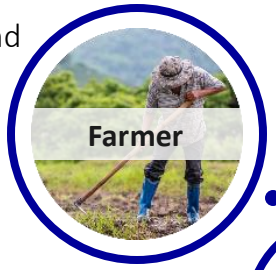


Transparency & Quality

Smallholder farmers sequestering carbon are monitored by satellites and offer their carbon removal units to companies

Supply

Farmer registers and has sequestered 1 tCO_2eq over the last year



Intermediary

Intermediary

Platform

Remote sensing measures sequestered CO_2 and generates 1 CRU

Carbon Removal Unit (CRU)

Payment

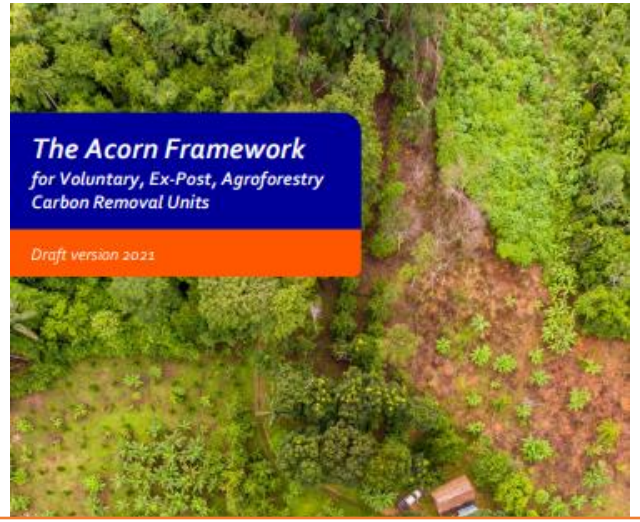
Register

Global register certified CRUs

Demand

Client has a carbon footprint of 1 tCO_2eq in last year and buys CRU

We provide high-integrity CRU conform our own framework and methodology

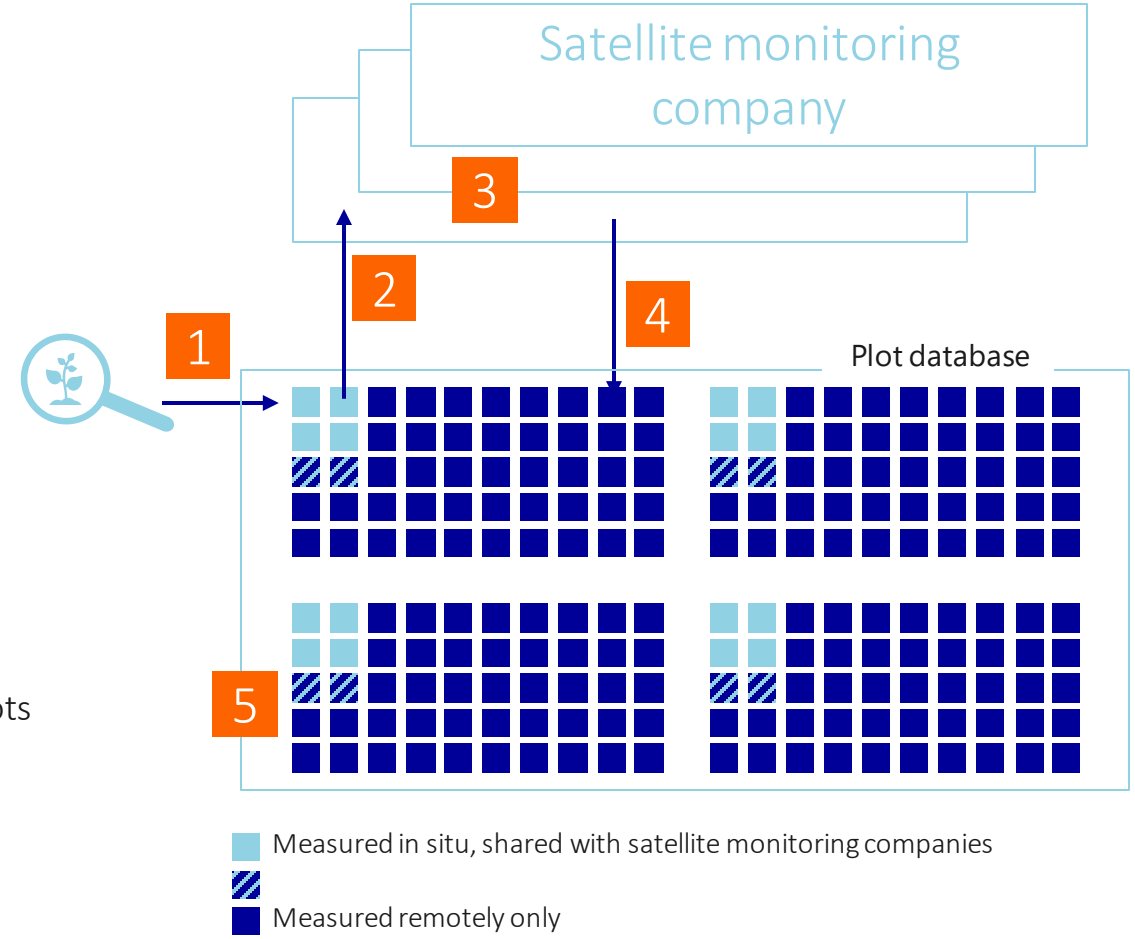


Framework addresses amongst others eligibility criteria and is approved by Certifier

Methodology outlines how carbon removal is quantified and is approved by Verifier

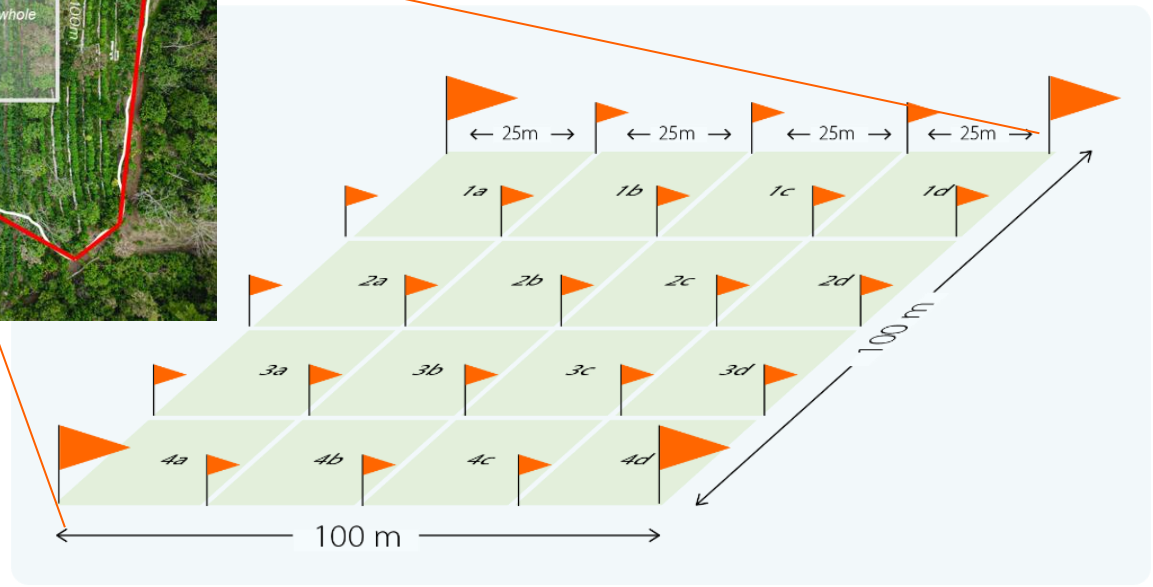
Satellite monitoring is applied to ensure cost-efficient measurement with ground truth data to ensure accuracy

1. Rabobank and partners collect the ground truth data to measure the total carbon storage ($AGB_{t=0}$) in situ for 100+ locations:
   - Hand measurements (counting / measuring trees)
   - Lidar technology (terrestrial/aerial)
   - Commercial satellite data
2. Rabobank shares the data with satellite parties
3. Satellite parties use the data to train their AI models
4. Satellite parties calculate all remaining pilot plots using their AI models
5. Rabobank assesses the accuracy by assessing the [20] in situ measured plots that have not been shared



We collect ground truth data to further enhance the models

- Define sample plot
- Define subplots within the sample plot
- Measure trees per subplot
- Translate tree measurement into AGB



With the trained models we translate the measured delta in AGB to Carbon Removal Units

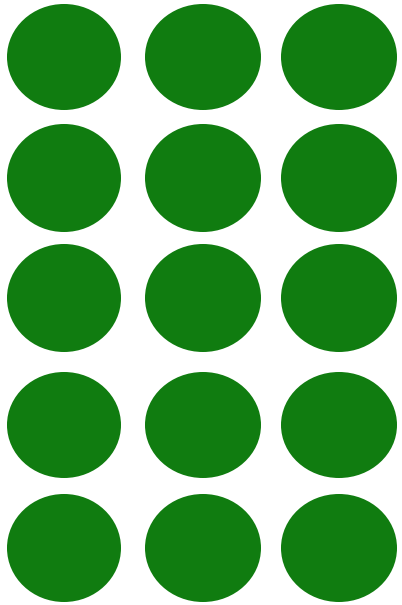
- BGB is determined by local data project value or ecological zones or otherwise, a default value of 1.32
- Carbon fraction (CF) and Carbon-to-carbondioxide (44/12) ensure a uniform measurement
- For the uncertainty (AdjU) in the temporal change of the aboveground biomass a factor is applied, as well for the baseline (AdjB) as leakage (AdjL)

$$\Delta TB = \left(AGB_y - AGB_{y-1}\right) \cdot BGB \cdot CF \cdot \frac{44}{12} \cdot AdjU$$

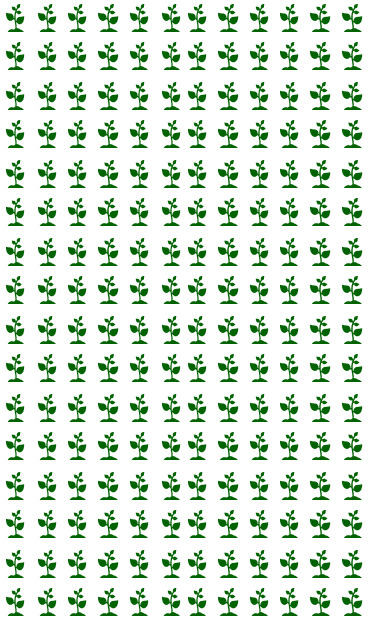
$$PR_{plot,y} = \Delta TB$$

$$CRU_{Plot,y} = PR_{plot,i,y} \cdot \frac{1}{1+BP} \cdot AdjB \cdot AdjL$$

Ambition is to empower 15 million farmers compensating 150+ Mt CO_2eq annually



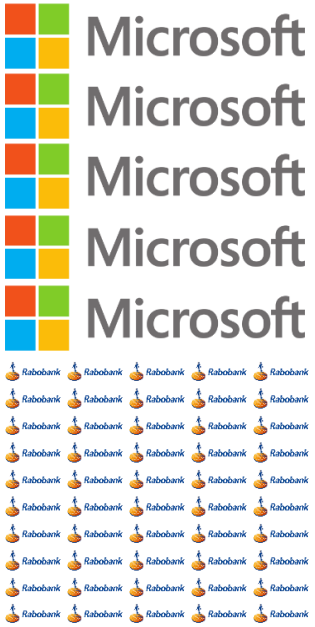
~15 million farmers with ~1 hectare (~25% of Kenya)



~4 billion trees (~250 per farmer)

=

150+ Mt CO_2eq sequestration per annum



~5x Microsoft + ~500x Rabobank annual emissions

Thank You

#EO4Impact

Christophe heads up the Satellite Applications Catapult's Sustainable Finance programme, promoting the geospatial technology innovations for the financial services market. Christophe is also the Innovation and Impact Lead within the Oxford Sustainable Finance Programme, developing innovation strategy and partnerships for the UK Centre for Greening Finance and Investment as well as the Spatial Finance Initiative which he co-founded.

Previously Christophe held roles at the European Space Agency, working as a business analyst and at Henkel, working across credit management and sales controlling. Christophe holds an MSc in Business Engineering from the University of Antwerp, specialising in finance, accountancy, and environmental economics.

Christophe Christiaen
Sustainable Finance Lead
Satellite Applications Catapult

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Asset-level Insights for Private Climate Finance

Christophe Christiaen - Sustainable Finance Lead at Satellite Applications Catapult / Innovation and Impact Lead at Oxford Sustainable Finance Programme

23 September 2021

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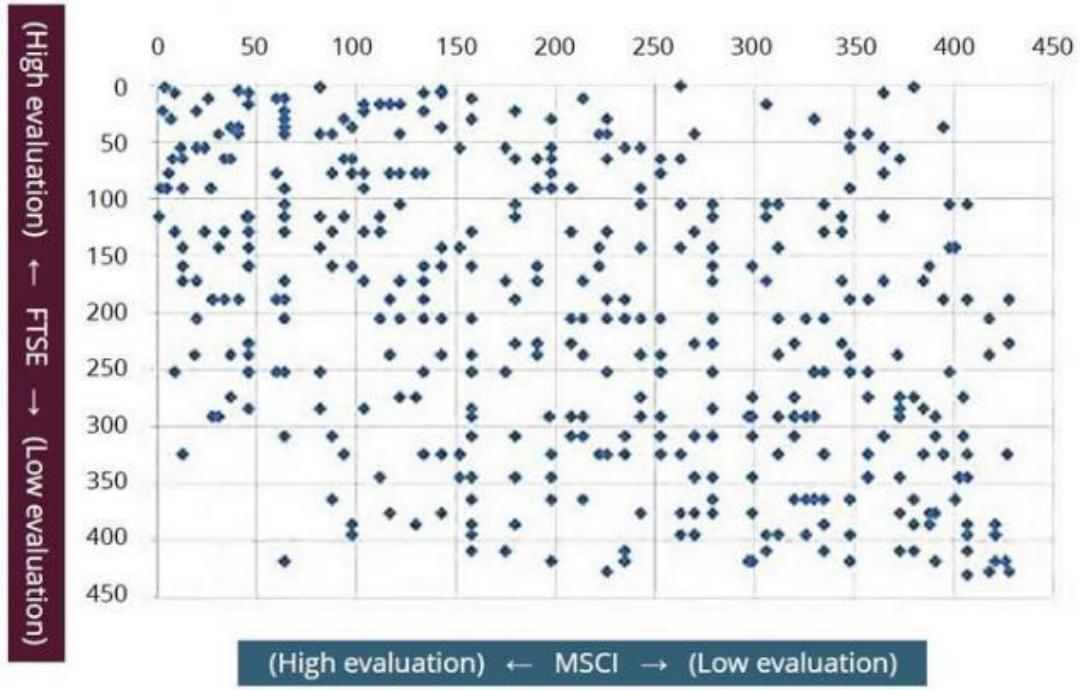
Data Challenge

Main source of data on a company's sustainability performance is its voluntarily reported information or 'disclosures'. This comes with various challenges:

- Information is **self-disclosed** and typically compiled top-down
- ESG reporting is not mandatory, which means **not all companies report**
- ESG reporting not standardised, which means **data is not comparable**
- Annual reporting means ESG **data is outdated** once released

Figure 1 – Comparison of ESG scores from FTSE



Source: CLSA, GPIF

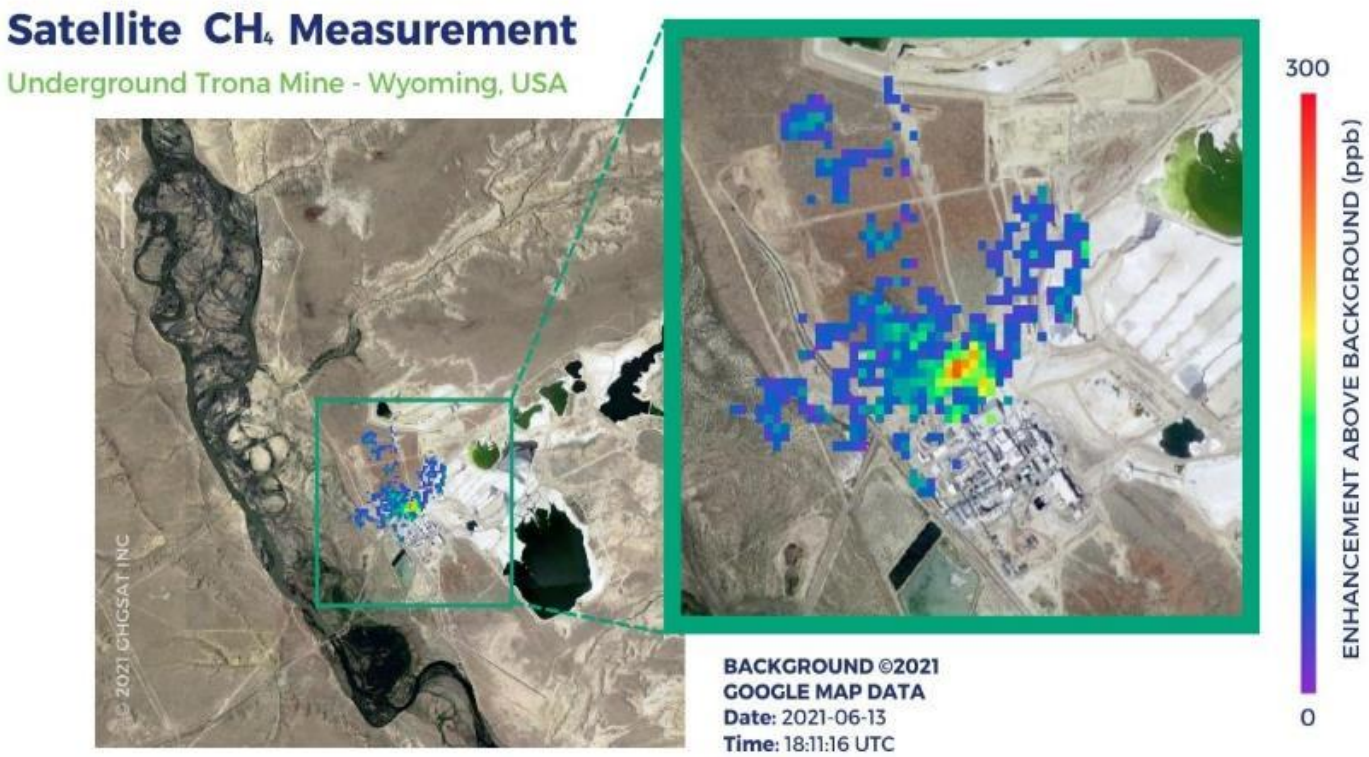
EO Value Proposition

Space technology advancements have meant an exponential increase in satellite data availability.

Advances in **data science** techniques allows for automated analysis of these increasingly large and complex datasets.

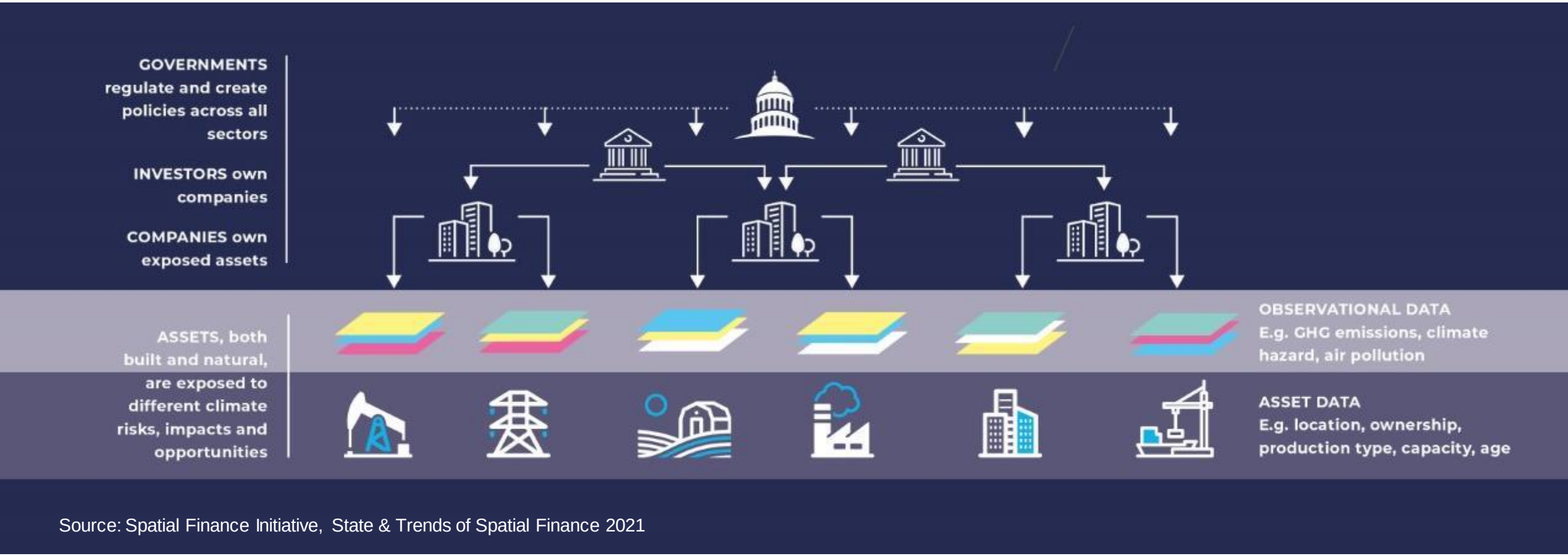
Satellite Earth Observation data has an inherent value proposition as a data source for private climate finance:

- **Neutral**
- **Bottom up**
- **Comparable**
- **Timely**



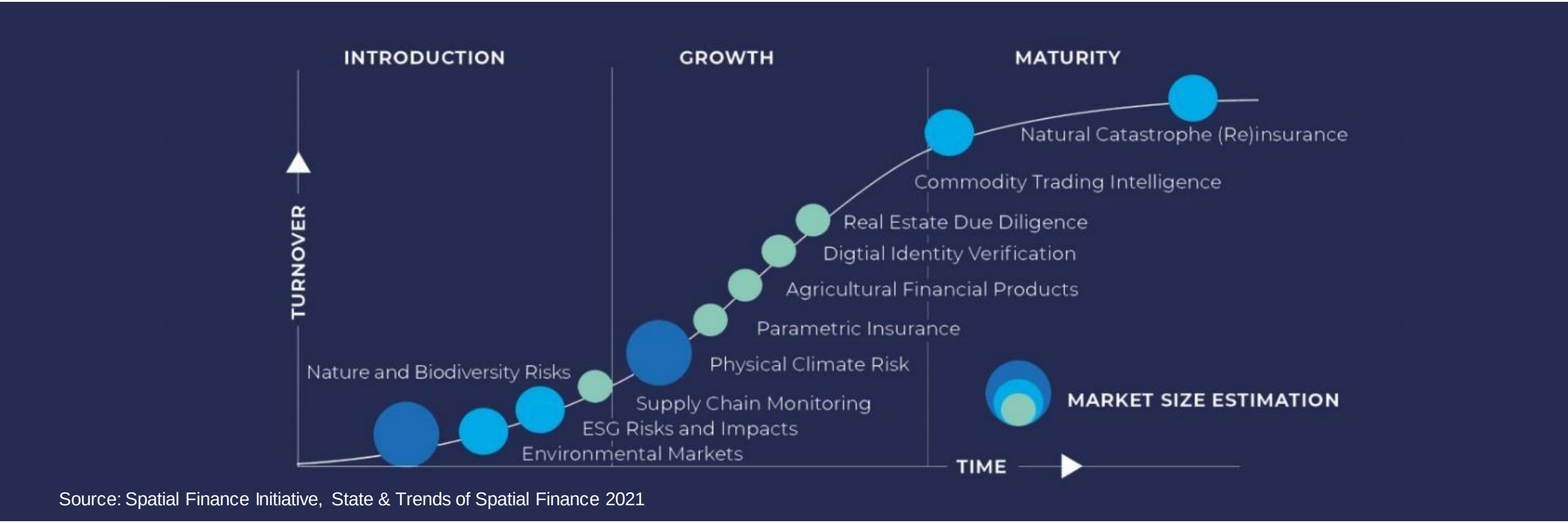
Credits: GHGSat

Asset-Level Insights



Source: Spatial Finance Initiative, State & Trends of Spatial Finance 2021

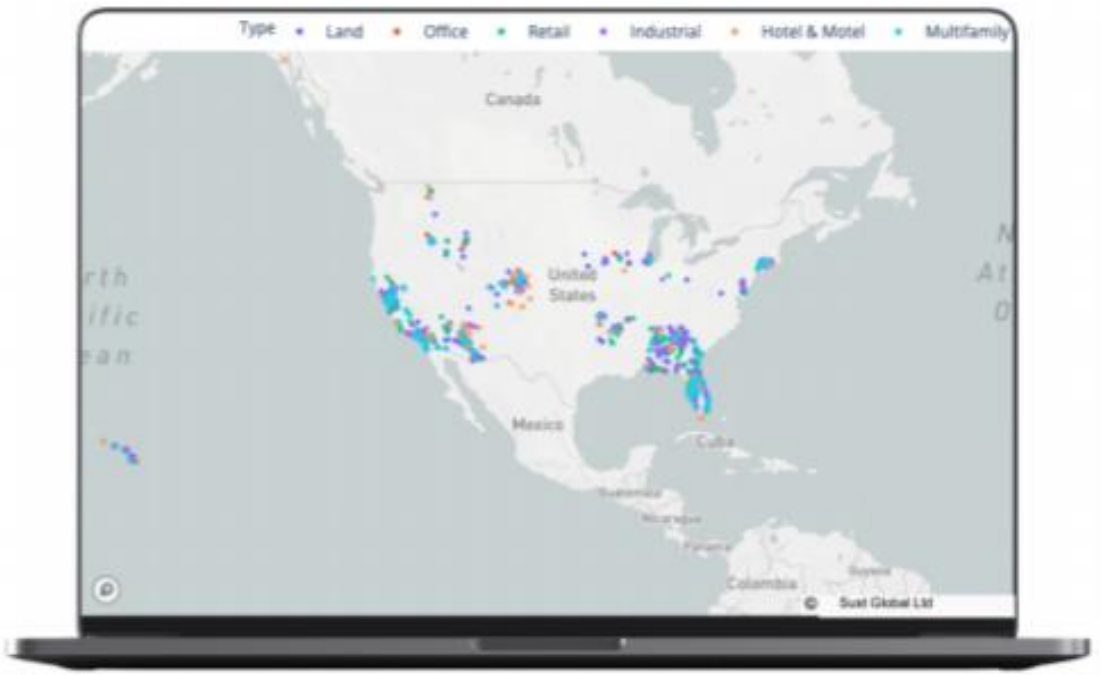
Spatial Finance Applications



Source: Spatial Finance Initiative, State & Trends of Spatial Finance 2021

Spatial Finance Applications

Physical Climate Risk

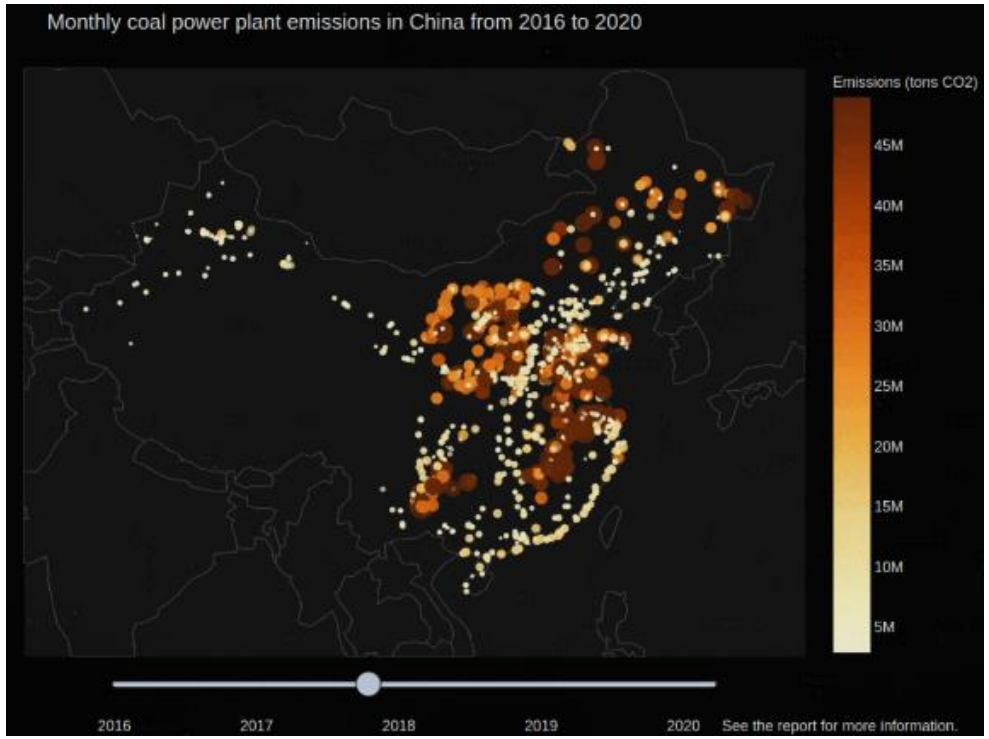


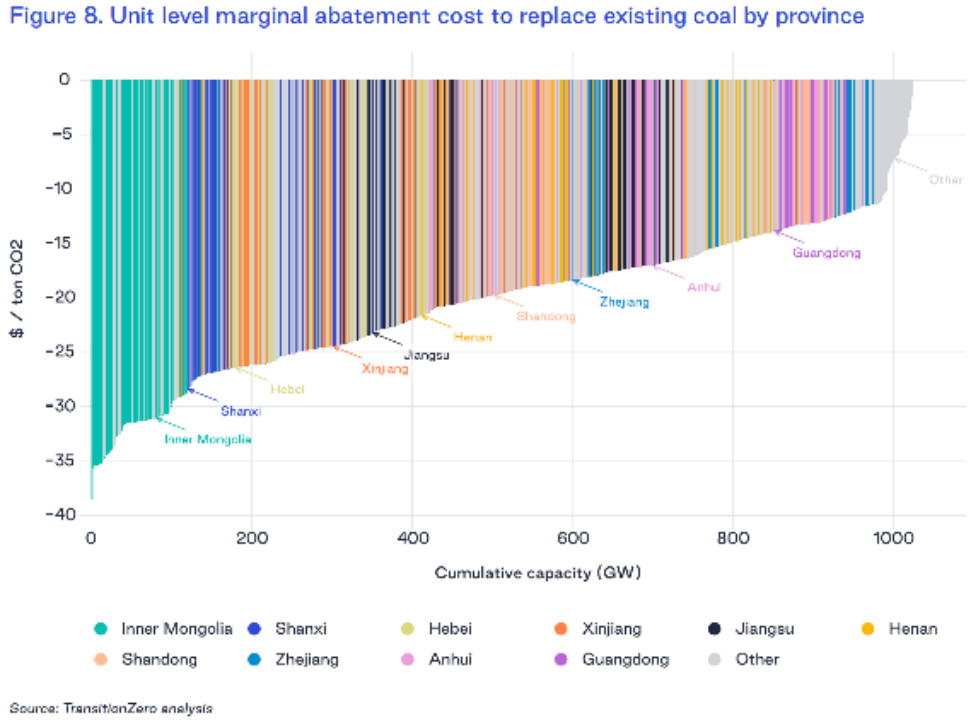
Address	lat	lng	Type	fire	flood	SLR	Cyclone	Price	max_risk	dominant_risk_type	estimated_loss
256-260 Bushwick Avenue, Brooklyn, NY	40.707381	-73.939302	Refinance	0.025438	0.000000	0.000000	0.461538	1100000	0.461538	Cyclone	2.028769e+06
1150 Babcock Road, San Antonio, TX	29.472340	-98.537060	Acquisition	0.268518	0.033333	0.000000	0.000000	925000	0.268518	fire	1.055989e+06
3280 Finfeather Road, Bryan, TX	30.635896	-96.367807	Acquisition	0.172963	0.000000	0.000000	0.000000	802000	0.172963	fire	5.545443e+05
115-139 Arbour Lane, Buffalo, NY	42.837221	-78.818107	Acquisition	0.008595	0.000000	0.000000	0.000000	7475000	0.300516	fire	2.569948e+04
149-169 Frederick Street And 168 And 164 Mordw...	41..047781	-73.521722	Acquisition	0.003094	0.000000	0.000000	0.461538	751000	0.461538	Cyclone	1.349538e+06
202-228 West Dakota Avenue, Fresno, CA	36.736723	-119.814324	Refinance	0.270936	0.000000	0.000000	0.000000	756000	0.270936	fire	8.103139e+05
1800 Belmont Park Drive Southeast, Smyrna, GA	33.895629	-84.523603	Acquisition	0.003857	0.000000	0.000000	0.615385	7325000	0.615385	Cyclone	1.503077e+06
3301 Hughes Lane, Dickinson, TX	29.468790	-95.051338	Refinance	0.161264	0.100000	0.000000	0.000000	7500000	0.161264	fire	4.837909e+05
17-19 Hunter Street, Boston, MA	42.309280	-71.062868	Refinance	0.001766	0.000000	0.467395	0.000000	7558000	0.467395	SLR	1.413425e+06
5305 North Boulevard, Tampa, FL	27.995775	-82.467302	Acquisition	0.013621	0.100000	0.000000	0.769231	6555000	0.769231	Cyclone	2.016923e+06
138 Waverly Way, Carrollton, GA	33.554463	-85.064763	Acquisition	0.013389	0.000000	0.000000	0.769231	5600000	0.769231	Cyclone	1.723077e+06
2941-2971 North Spaulding Boulevard, 3350-3378 ...	32.260849	-110.928622	Refinance	0.078358	0.000000	0.000000	0.000000	6240000	0.370310	fire	1.754933e+05
4235 Tyler Avenue, El Monte, CA	34.084286	-118.031136	Refinance	0.078928	0.000000	0.000000	0.000000	6775000	0.370928	fire	1.905998e+05
3251 South 176th Street, Seatac, WA	47.444139	-122.289364	Refinance	0.062683	0.033333	0.000000	0.000000	8838000	0.362683	fire	2.213946e+05
1446-1452 West Thorndale Avenue, Chicago, IL	41..990189	-87.666973	Acquisition	0.049308	0.000000	0.000000	0.000000	5778000	0.349308	fire	1.229957e+05
16605 Dalton Avenue, Gardena, CA	33.883762	-118.309218	Acquisition	0.010827	0.000000	0.000000	0.000000	8958000	0.010827	fire	2.254100e+04
20446-20456 Seticoy Street, Los Angeles, CA	34.208246	-118.578961	Refinance	0.078928	0.000000	0.000000	0.000000	13158000	0.370928	fire	3.689278e+05
1701 Northwest 40th Street, Oklahoma City, OK	35.518753	-97.539527	Refinance	0.115371	0.000000	0.000000	0.000000	5908000	0.115371	fire	2.722767e+05
6421 Benning Street, Orangevale, CA	38.692160	-121.303803	Refinance	0.117938	0.066667	0.000000	0.000000	5948000	0.117938	fire	2.802224e+05
18 Amelia Olive Branch Road, Amelia, OH	39.044512	-84.226448	Refinance	0.082454	0.000000	0.000000	0.000000	5108000	0.082454	fire	1.682064e+05
5525 4th Street, Lubbock, TX	33.592201	-101.933448	Acquisition	0.590455	0.000000	0.000000	0.000000	4948000	0.590455	fire	1.166746e+06
7501 Lomas Boulevard Northeast, Albuquerque, NM	35.087341	-106.563474	Refinance	0.173548	0.000000	0.000000	0.000000	4768000	0.173548	fire	3.304348e+05
387 Sleepy Hollow Drive, Cleveland, TX	30.341122	-95.091536	Refinance	0.680621	0.000000	0.000000	0.000000	6498000	0.680621	fire	1.769616e+06
1150 Simonton Street North, Covington, TN	35.578121	-89.653532	Refinance	0.113168	0.000000	0.000000	0.769231	5408000	0.769231	Cyclone	1.661538e+06
1887 South 128th Street, Burien, WA	47.497656	-122.318493	Refinance	0.062683	0.000000	0.000000	0.000000	7008000	0.362683	fire	1.755128e+05
2359 South Wycliff Circle, Mesa, AZ	33.372187	-111.858034	Refinance	0.020581	0.000000	0.000000	0.000000	5008000	0.020581	fire	4.116102e+04
1515-1539 East Fort Lowell Road, 1617-1639 Eas...	32.264885	-110.948942	Refinance	0.078358	0.000000	0.000000	0.000000	5068000	0.370310	fire	1.428995e+05
179 Madison Street, Passaic, NJ	40.908886	-74.365329	Refinance	0.012182	0.033333	0.000000	0.461538	4708000	0.461538	Cyclone	6.676923e+05
822-824 North Damen Boulevard, Chicago, IL	41..896557	-87.684774	Refinance	0.049308	0.000000	0.000000	0.000000	4448000	0.349308	fire	8.755688e+04
301 West Turney Avenue, Phoenix, AZ	33.500157	-112.078267	Refinance	0.000679	0.033333	0.000000	0.000000	4708000	0.033333	flood	6.266667e+04

Credits: Sust Global

Spatial Finance Applications

Emissions Modelling and Transition Risk

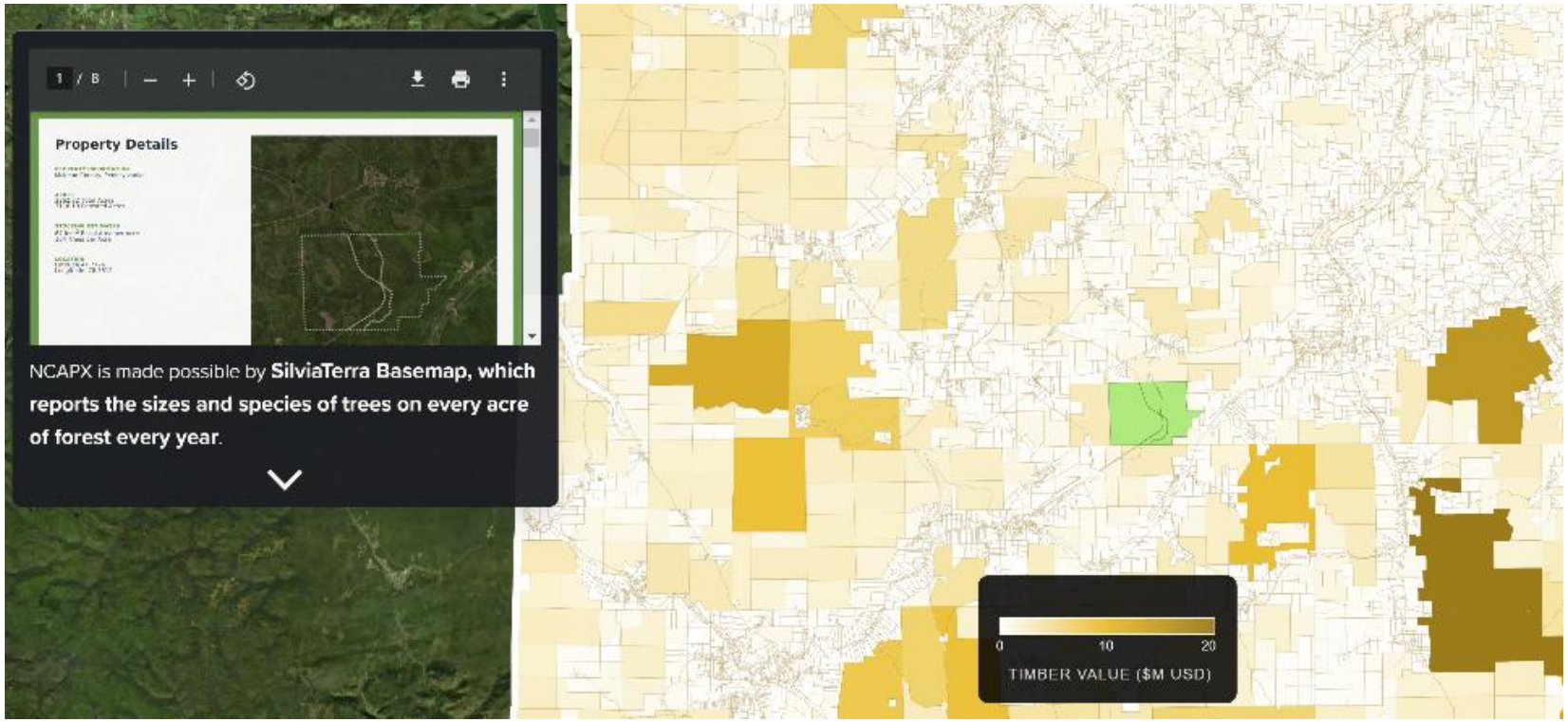




Credits: TransitionZero, 2021, "Turning the Super Tanker - Powering China's coal to clean transition with actionable analytics

Spatial Finance Applications

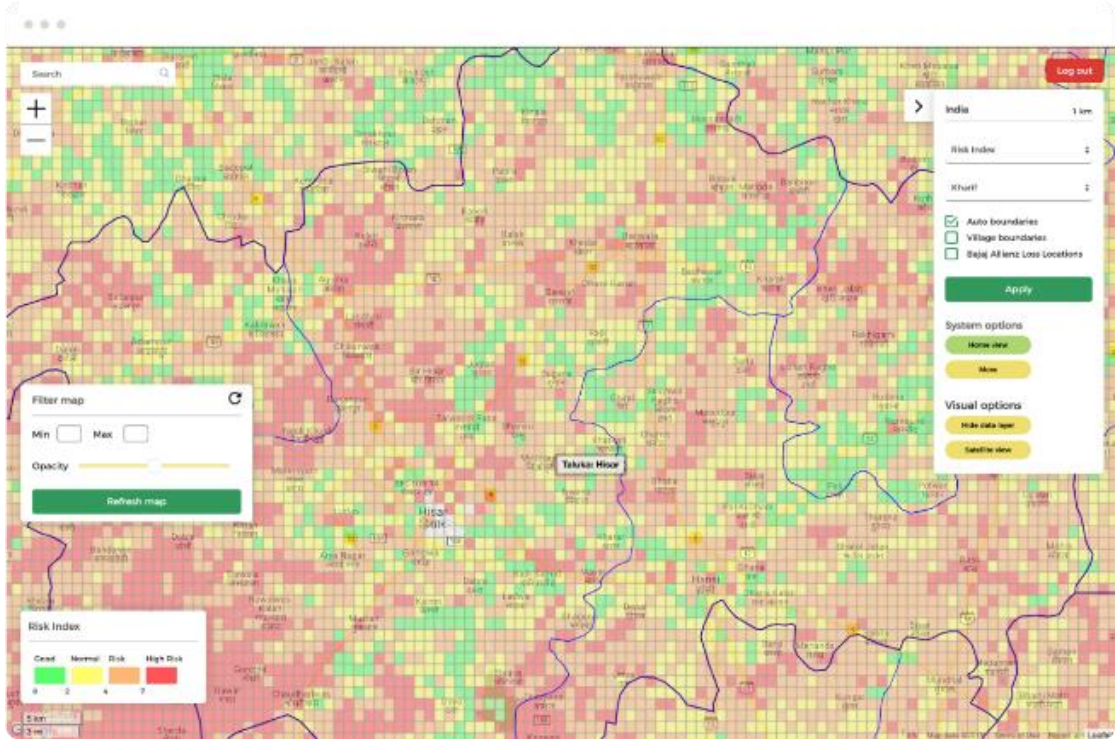
Environmental Markets

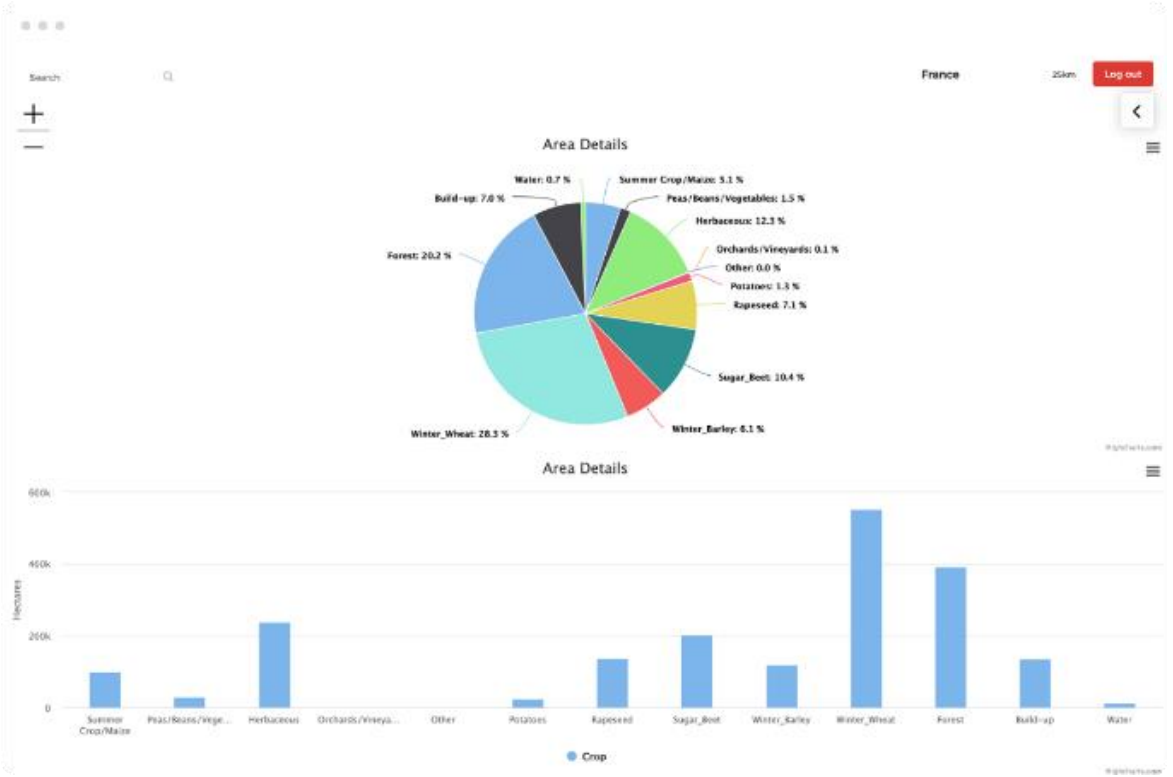


Credits: SilviaTerra, Natural Capital Exchange

Spatial Finance Applications

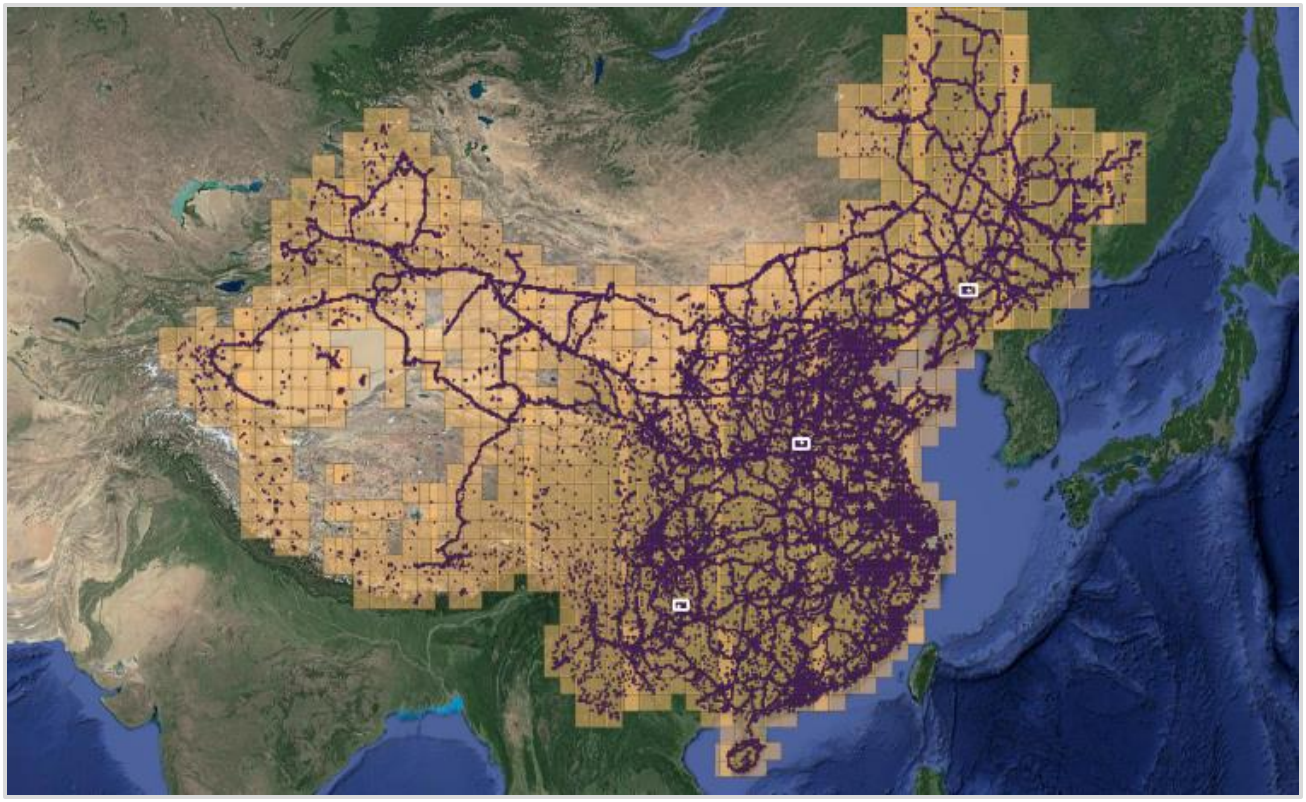
Agricultural Credit and Insurance for Emerging Markets





Credits: Mantle Labs

GeoAsset: Digital Footprint of Global Economy



New Plant

Known Plant

False Positive

Credits: Spatial Finance Initiative, Astraea Inc

GeoAsset: Digital Footprint of Global Economy

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	uid	city	state	country	iso3	country_code	region	sub_region	latitude	longitude	accuracy	status	plant_type	production_type	capacity	capacity_source	year	owner_permid	owner_name
2	GACTAFG0001	Pol-e Khomri	Baghlan	Afghanistan	AFG	4	Asia	Southern Asia	35.9658	68.686338	Exact	Operating	Integrated	Wet	0.36	https://prd-wret.s3			
3	GACTAFG0002	Injil	Herat	Afghanistan	AFG	4	Asia	Southern Asia	34.322144	61.953503	Exact	Under Construction							
4	GACTAGO0001	Luanda	Luanda	Angola	AGO	24	Africa	Sub-Saharan Africa	-8.766173	13.316051	Exact	Operating	Integrated		1.2	https://prd-wret.s3		4296811479	Nova Cimangola
5	GACTAGO0002	Cacuaco	Luanda	Angola	AGO	24	Africa	Sub-Saharan Africa	-8.796392	13.42678	Exact	Operating	Integrated	Dry	1.83	Estimated	2017	4296811479	Nova Cimangola
6	GACTAGO0003	Lobito	Benguela	Angola	AGO	24	Africa	Sub-Saharan Africa	-12.342644	13.581766	Exact	Operating	Grinding		0.35	https://prd-wret.s3		5035943898	Secil Angola SARL
7	GACTAGO0004	Sumbe	Kwanza-Sul	Angola	AGO	24	Africa	Sub-Saharan Africa	-11.185243	14.030804	Exact	Operating	Integrated	Dry	1.4	https://prd-wret.s3			
8	GACTAGO0005	Ícolo e Bengo	Bengo	Angola	AGO	24	Africa	Sub-Saharan Africa	-9.101295	13.567408	Exact	Operating	Integrated	Dry	4	https://prd-wret.s3			
9	GACTAGO0006	Benguela	Benguela	Angola	AGO	24	Africa	Sub-Saharan Africa	-12.537825	13.496729	Exact	Operating	Grinding		0.7	https://prd-wret.s3			
10	GACTALB0001	Rrethi i Lezhës	Qarku i Lezhës	Albania	ALB	8	Europe	Southern Europe	41.83677	19.63345	Exact	Operating	Grinding		0.5	https://prd-wret.s3	2010		Colacem Albania Shpk
11	GACTALB0002	Rrethi i Krujës	Qarku i Durrësit	Albania	ALB	8	Europe	Southern Europe	41.503079	19.743606	Exact	Operating	Integrated	Dry	1.33	https://prd-wret.s3		4296766190	Kushe Kruje Cement Factc
12	GACTALB0003	Rrethi i Krujës	Qarku i Durrësit	Albania	ALB	8	Europe	Southern Europe	41.549091	19.725338	Exact	Operating	Integrated	Dry	1.4	https://prd-wret.s3	2010	5036173163	Antea Cement ShA
13	GACTALB0004	Rrethi i Elbasanit	Qarku i Elbasanit	Albania	ALB	8	Europe	Southern Europe	41.120103	20.045136	Exact	Operating	Integrated		0.3	https://prd-wret.s3			
14	GACTARE0001	Eastern Region	Abu Dhabi	United Arab Emirates	ARE	784	Asia	Western Asia	24.003398	55.438602	Exact	Operating	Integrated	Dry	3.6	https://www.emira		5074852997	Al Ain Cement Factory
15	GACTARE0002	Al Ain	Abu Dhabi	United Arab Emirates	ARE	784	Asia	Western Asia	24.137441	55.733956	Exact	Operating	Integrated	Dry	1.14	Estimated	1994	5035440316	Emirates Cement Factory
16	GACTARE0003	Dubai	Dubai	United Arab Emirates	ARE	784	Asia	Western Asia	24.998572	55.134171	Exact	Operating	Grinding					5035580861	CEMEX Falcon LLC
17	GACTARE0004	Ghalilah	Ras al Khaimah	United Arab Emirates	ARE	784	Asia	Western Asia	25.972745	56.070834	Exact	Operating	Integrated	Dry	3.8	https://gulfcement	1982	4295893472	Gulf Cement Co PSC
18	GACTARE0005	Dubai	Dubai	United Arab Emirates	ARE	784	Asia	Western Asia	25.00427	55.12941	Exact	Operating	Grinding		0.84	https://www.jacen	1978	5041755029	Jebel Ali Cement Factory I
19	GACTARE0006	Ras Al-Khaimah	Ras al Khaimah	United Arab Emirates	ARE	784	Asia	Western Asia	25.548753	55.986541	Exact	Operating	Integrated	Dry	1	https://www.jkcen	2014	5036198541	JK Cement Works Fujairah
20	GACTARE0007	Dibba Al Fujairah	Fujairah	United Arab Emirates	ARE	784	Asia	Western Asia	25.552944	56.226827	Exact	Operating	Integrated	Dry	3.2	https://www.lafarg	1996	4296646466	Lafarge Emirates Cement
21	GACTARE0008	Ras Al-Khaimah	Ras al Khaimah	United Arab Emirates	ARE	784	Asia	Western Asia	25.558872	55.985251	Exact	Operating	Integrated	Dry				4296646466	Lafarge Emirates Cement
22	GACTARE0009	Abu Dhabi	Abu Dhabi	United Arab Emirates	ARE	784	Asia	Western Asia	24.315716	54.495748	Exact	Operating	Grinding					4295893487	National Cement Co PSC
23	GACTARE0010	Eastern Region	Abu Dhabi	United Arab Emirates	ARE	784	Asia	Western Asia	24.040157	55.593386	Exact	Operating	Grinding					5050910802	Nael Cement Products Fac
24	GACTARE0011	Dubai	Dubai	United Arab Emirates	ARE	784	Asia	Western Asia	25.157152	55.242025	Exact	Operating	Integrated	Dry	1.5	http://www.nation		4295893487	National Cement Co PSC
25	GACTARE0012	Adhen Village	Ras al Khaimah	United Arab Emirates	ARE	784	Asia	Western Asia	25.386639	55.968218	Exact	Operating	Integrated	Dry	1.2	https://pioneercen	2006	5001427098	Pioneer Cement Industrie
26	GACTARE0013	Ghalilah	Ras al Khaimah	United Arab Emirates	ARE	784	Asia	Western Asia	25.975192	56.068896	Exact	Operating	Integrated	Dry	1	http://rakcc.ae/en		4298061671	Ras Al Khaimah Cement C
27	GACTARE0014	Ghalilah	Ras al Khaimah	United Arab Emirates	ARE	784	Asia	Western Asia	25.964045	56.069847	Exact	Operating	Integrated	Dry	0.9	http://www.rakwh	1978	5000050939	Ras Al Khaimah for White

Credits: Spatial Finance Initiative, Astraea Inc

Thank You!

Christophe Christiaen / 23 September 2021
@FinanceSpatial / Christophe.Christiaen@sa.catapult.org.uk

#EO4Impact

Matthias is leading the unit @giz dealing with *Disaster Risk Finance and Insurance*. He has sixteen years expertise in strategic planning and implementation of various projects (Finance and –insurance; climate and disaster risk management/ -insurance; private sector development) with the German International Cooperation (GIZ).

Over the last 10 years Matthias was responsible for building up the insurance portfolio at GIZ as well as innovate products and business opportunities across various technical departments within GIZ.

This was prepared by a university degree in business administration with a focus on international marketing and change management at NUS Singapore and RWTH Aachen. Matthias and his family live close to the mountains in Bavaria's capital Munich

Matthias Range
Head of Unit
Deutsche Gesellschaft für Internationale Zusammenarbeit(GIZ)

Job is a flood risk management consultant at HKV, a consultancy firm and knowledge entrepreneur in water and safety founded in 1995.

He has been working on flood related projects for 22 years. Since 2003 he is mainly working on flood risk management studies in international settings. Many of Job his projects are carried out in data scarce regions. That means the use of remotely sensed open geo data, crowd sourcing and applied physics are essential in providing flood related services.

Job and his colleagues at HKV develop flood hazard, damage and risk models, but also operational flood early warning systems and water information systems.

HKV developed a flood risk model of Accra, which was vital input to a WB loan targeting flood mitigation measures in Accra region and later on used to pilot insurance products in a data scarce environment.

Job Udo

Senior Consultant Flood Risk Management

Dominik is a Senior Cat & Business Development Analyst at Allianz Re, the global reinsurance arm of Allianz SE. For the past 14 years at Allianz Re, he has worked in the fields of Nat Cat Management, Business Development, and Data Management, addressing climate change both from a risk perspective and as an opportunity to grow the business. He supported various departments within Allianz Re in the development of new data driven insurance products.

With passion and expertise (Dominik is a meteorologist by profession), he initiated and led numerous discussion on how Allianz as an organization could leverage climate change risk data to help their clients build resilience against the effects of climate change and to ensure the sustainable of Allianz' business model. Together with partners like GIZ and HKV consulting, he has shaped the understanding of how innovative & data driven approaches can help to close the insurance protection gap in Accra, Ghana and other regions of the global South.

Dominik Aulehner
Senior Cat & Business Development Analyst

GEO CLIMATE POLICY AND FINANCE WORKSHOP

SAGABI Project : Pilot Public Asset Insurance – Climate Finance Mechanism for Cities, Ghana

Matthias Range, Team Leader, GIZ
Job Udo, Senior Consultant, HKV
Dominik Aulehner, Senior Cat & Business Development Analyst, Allianz RE

23 September 2021

GEO GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

Climate Risk Management – the concept

Prevent
This phase comprises all the measures that help prevent or minimize possible damage from an event.

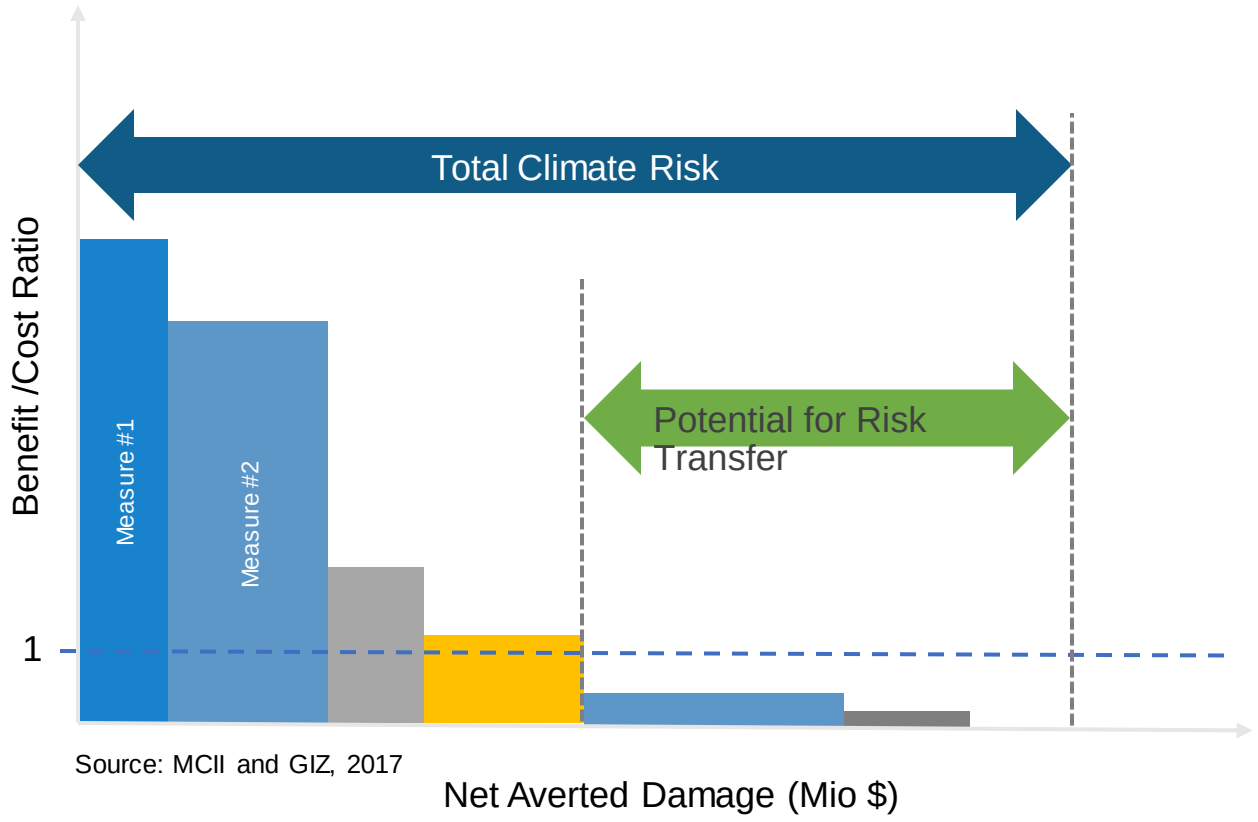
Recover
After a natural extreme event hits, infrastructure and other parts of society must be rebuilt, so that people can resume their livelihoods as quickly as possible.

Respond
This phase comprises all emergency measures aimed at saving human lives
in the event of a natural disaster.

Retain & Transfer
Residual risk can be transferred to third parties using financial instruments such as insurance.

Prepare
Preparedness contains a complex set of activities such as setting up early warning systems, developing contingency plans, organising various activities such as stockpiling of equipment, and coordination and training as cross-cutting issues.

Climate Risk Management – the idea



Source: MCII and GIZ, 2017

Benefits

- Sets the objective grounds for decision making which measure should be realized
- The residual risk should be transferred
- Incentivizes climate change adaptation, mitigation and disaster risk reduction.
- This can be extended towards social and ecological impacts (Lowers "1")

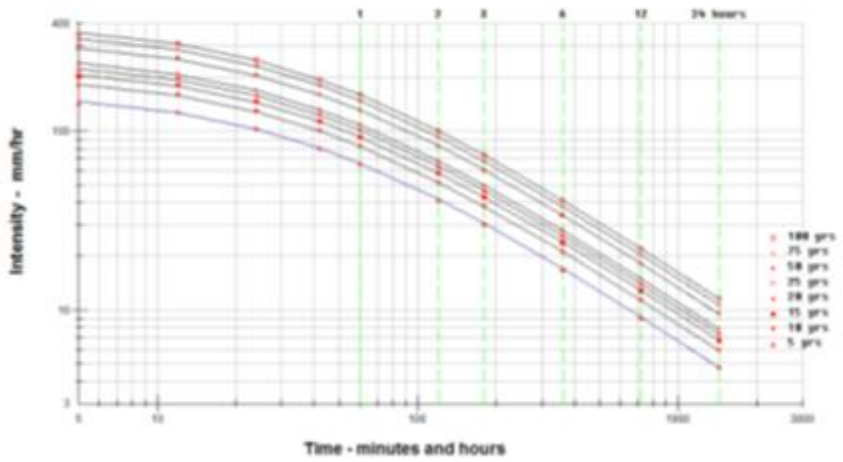
The Roadmap for ICRM - Urban Resilience in Ghana

"We were saved by all that risk data, once we realized we'd forgotten to order sandbags."

Pat Byrnes / CartoonStock.com

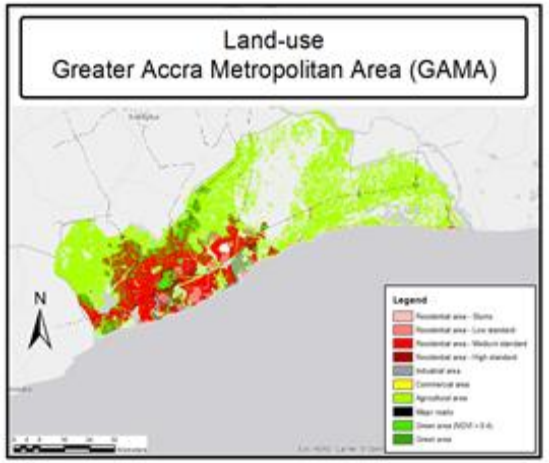
Flood risk model

Dynamic Maps



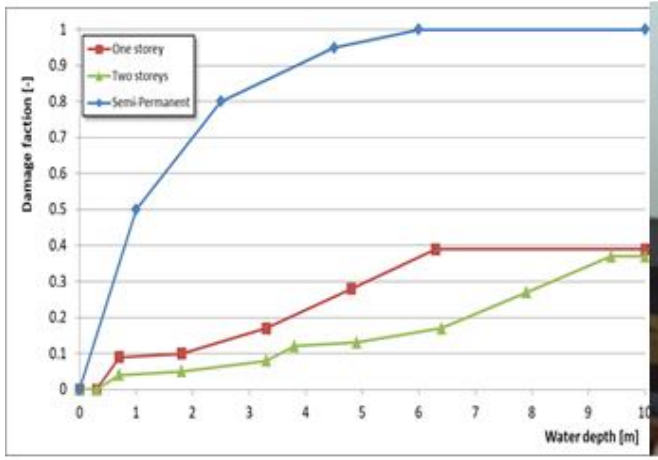
Flood risk model

Exposure data



Flood risk model

Vulnerability and damage



Impact assessment 2015

From risk assessment to tailored risk transfer solutions

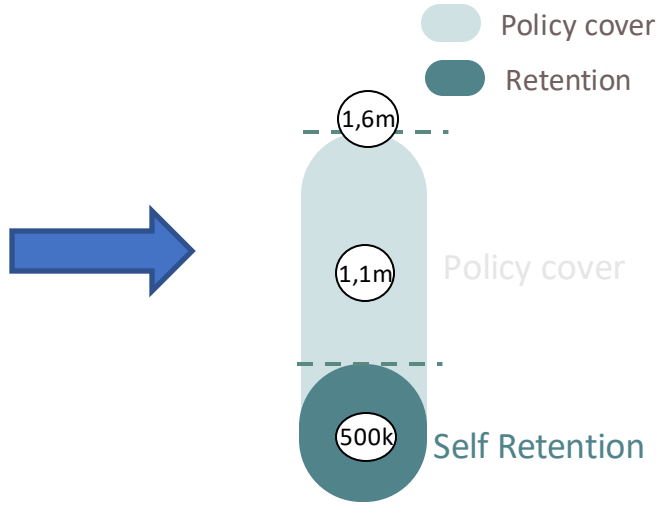
WHAT WE HAVE DESIGNED?

Indemnity based flood event cover for municipalities. It covers the losses of all insured assets after a severe single flood event via a claims pay-out

WHAT IS INCLUDED IN A PAYOUT?

Claims pay-out includes replacement costs of insured premises, unsecured inventories and 20 % buffer for emergency relief measures

Return Period	Estimated losses	What is covered
2	0,1m	- (losses are below the self-retention level)
5	0,3m	- (losses are below the self-retention level)
10	0,5m	Cover kicks in when losses >500k
25	0.7m	192.765
50	0,9m	432.105
100	1.2m	738.624
200	1.6m	1.100.000



Thank You!

Matthias Range - GIZ matthias.range@giz.de
Job Udo – HKV j.udo@hkv.nl
Gerbert Pleijter – HKV g.pleijter@hkv.nl
Dominik Andreas Aulehner - DOMINIK.AULEHNER@ALLIANZ.COM

#EO4Impact

Matt is Senior Director at Willis Towers Watson's Climate and Resilience Hub. In this role he leads the analytics and science activities in support of clients across finance, public and corporate sectors and he acts as a technical advisor to the Coalition for Climate Resilient Investment Management Team. Matt is also a member of the Global Resilience Index Task Force.

Matt has over 30 years' experience in the fields of earth observation, geospatial data and catastrophe risk analytics, across central government, the World Bank, and insurance.

In particular, Matt is focussed on the development of integrated physical risk analytics data and metrics to encourage investment in resilience measures to reduce physical climate risk to critical infrastructure and assets.

He is a Chartered Geographer, Fellow of the Royal Geographical Society, a Council Member of the Remote Sensing and Photogrammetry Society, and Honorary Secretary of the RGS Disaster Risk Management Professional Practice Group

Matt Foote

Senior Director, Analytics

Willis Towers Watson Climate and Resilience Hub

GEO CLIMATE POLICY AND FINANCE WORKSHOP

The Global Resilience Index Initiative - A Public Private Collaboration to build a common language of risk

Matt Foote – Senior Director, Climate and Resilience Hub, Willis Towers Watson

23 September 2021

GEO GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

GLOBAL RESILIENCE INDEX (GRI) INITIATIVE

CREATING A COMMON LANGUAGE OF RISK

Embedding risk within global financial flows and decisions at all levels to drive resilience and resilient investment

UNDRR UN Office for Disaster Risk Reduction
Coalition for Climate Resilient Investment
CDRI Coalition for Disaster Resilient Infrastructure
CGFI UK Centre for Greening Finance & Investment
DF Insurance Development Forum

GLOBAL RESILIENCE INDEX (GRI) INITIATIVE

OPEN PHYSICAL RISK DATA AND ANALYTICS

A COMMON LANGUAGE OF RISK across public, private, finance and civil society

CONSISTENT RISK METRICS – systemic risks, supply chains, trade, natural capital

SHARED ANALYTICS, allowing risk to be integrated into decision making

GLOBALLY CONSISTENT and integrated across hazards, assets, and timescales

INTEGRATED EXPERTISE – based on last decade of cross sector collaboration

OPEN TO ALL, public good. Inspired by UN GAR17 and Global Earthquake Model

PUBLIC – PRIVATE COLLABORATION TO BUILD A COMMON LANGUAGE AND UNDERSTANDING OF RISK

DF Insurance Development Forum
Public-private partnership co-chaired by World Bank – UNDP – Insurance Industry

CDRI Coalition for Disaster Resilient Infrastructure
Partnership of national governments, UN agencies, MDBs and private sector

CCRI Coalition for Climate Resilient Investment
Public-private partnership institutional investors, financial institutions, ratings agencies, knowledge organisations

UNDRR UN Office for Disaster Risk Reduction

CGFI UK Centre for Greening Finance & Investment

Open platform for collaboration
Contributing institutions to date:

SPATIAL FINANCE INITIATIVE
GEM GLOBAL EARTHQUAKE MODEL working together to assess risk
Nasdaq
Fathom
eci
SUSTAINABLE FINANCE PROGRAMME
UNIVERSITY OF OXFORD
oasis
JBA risk management
Milliman
DAFNI Data & Analytics Facility for National Infrastructure

RACE TO RESILIENCE
UN CLIMATE CHANGE CONFERENCE UK 2021

Builds upon the UN's GAR17. A multi-agency effort to create the first public good, globally consistent, multi-hazard catastrophe risk model.

Source: UNDRR Global Assessment Report (GAR 2017)

GEM
GLOBAL EARTHQUAKE MODEL
working together to assess risk

GLOBAL RESILIENCE INDEX INITIATIVE

Proven public-private-academic model, focussed on standards and interoperability

UNDRR UN Office for Disaster Risk Reduction
Coalition for Climate Resilient Investment
CDRI Coalition for Disaster Resilient Infrastructure
CGFI UK Centre for Greening Finance & Investment
DF Insurance Development Forum

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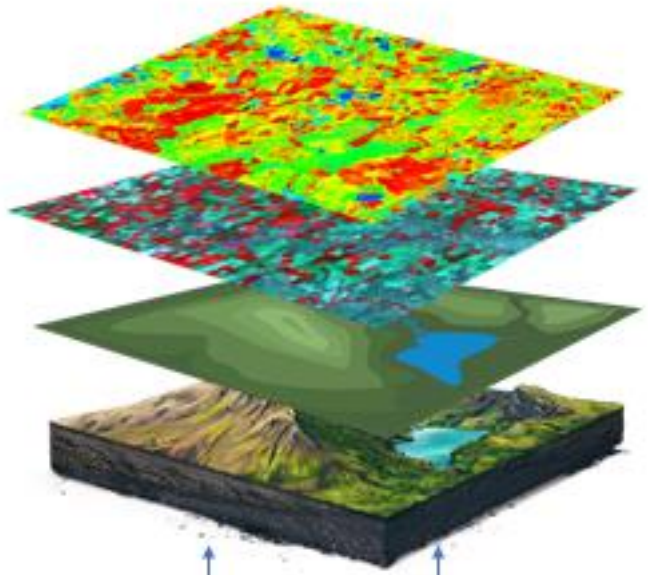
GLOBAL RESILIENCE INDEX (GRI) INITIATIVE
OPEN PHYSICAL RISK DATA AND ANALYTICS

Vision:

Finance and investment, IFIs government, civil society and firms able to access and use globally consistent, transparent acute physical risk data for:

- Every point on the planet
- Covering all material risks
- Present and future



CDRI | CGFI | SPATIAL FINANCE INITIATIVE | GEM GLOBAL EARTHQUAKE MODEL | Fathom | eci

Why is this different?

Acute risks: using insurance approaches

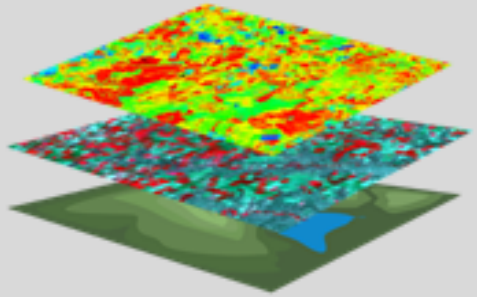
Globally-consistent, open data, standards and indices: An open platform of high-quality, consistent, hazard, exposure and risk data covering material risks.

Transparent & builds upon what is exists: combines best-in-class data from partners to generate **sub-national/asset-level** risk metrics: exposures, AALs, EPs

Strategically fills gap to cover material risks and represent uncertainties, scenarios & tail risks, wider perils, system-level risk, supply chains, indirect economic losses

EXAMPLE SECTOR APPLICATIONS AND COLLABORATIONS

PHYSICAL RISK DATA AND ANALYTICS



DISASTER RISK MANAGEMENT, ADAPTATION PLANNING AND DISASTER RISK FINANCE

e.g. CCDRs, National Financial Protection Strategies

RESILIENT INVESTMENT AND PARIS ALIGNMENT

Screening/Rating Resilient Investments/ Paris Alignment

CLIMATE-FINANCIAL RISK ASSESSMENT, GREEN FINANCE, DISCLOSURE, FINANCIAL STABILITY

e.g. FSAPs, Sovereign Risk Metrics

GLOBAL/REGIONAL RISK MONITORING & RISK FINANCE SYSTEMS

e.g. GCRP, CRW

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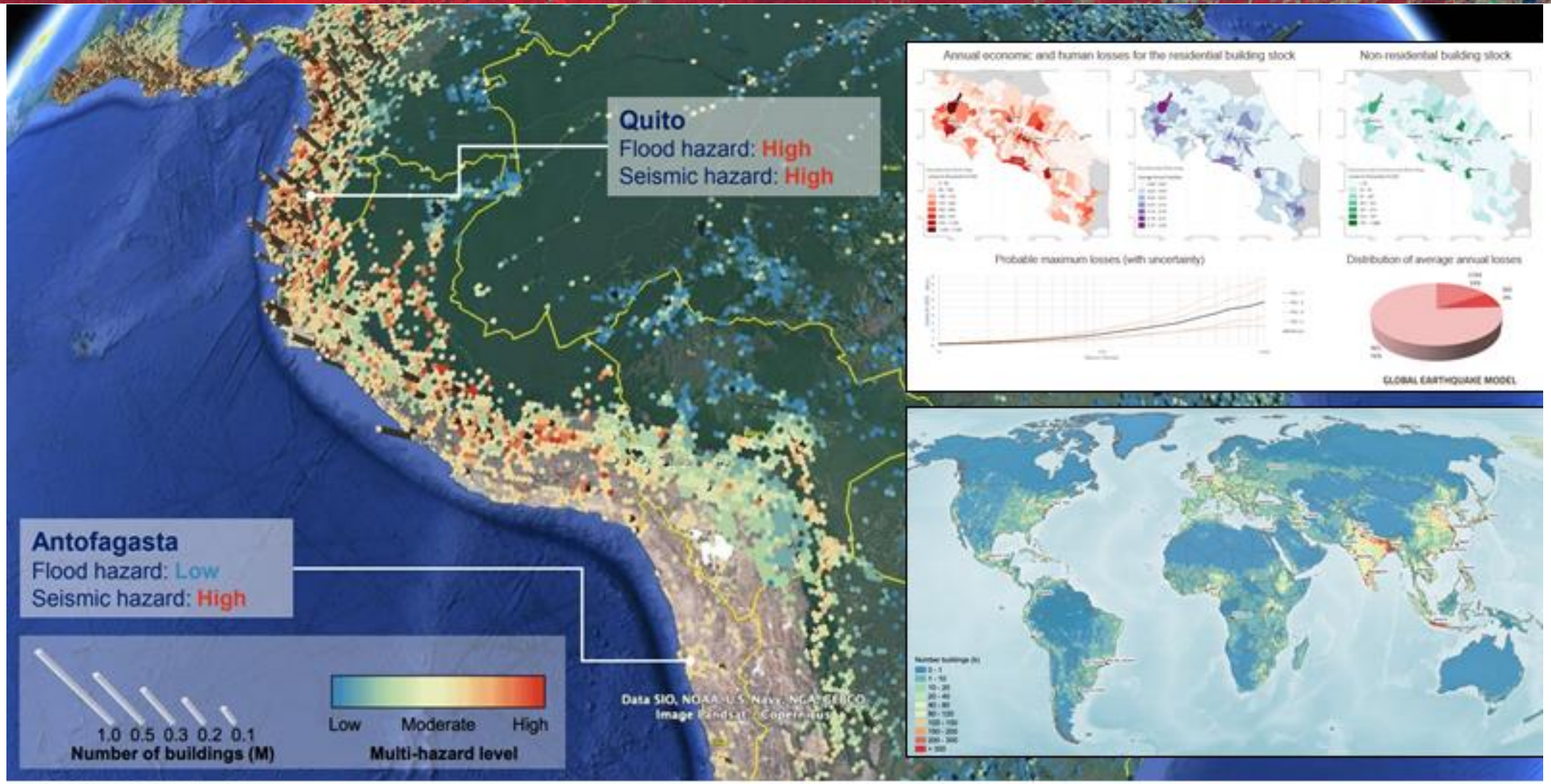
Quito
Flood hazard: High
Seismic hazard: High
Antofagasta
Flood hazard: Low
Seismic hazard: High
1.0 0.5 0.3 0.2 0.1
Number of buildings (M)
Low
Moderate
High
Multi-hazard level
Annual economic and human losses for the residential building stock
Non-residential building stock
Probable maximum losses (with uncertainty)
Distribution of average annual losses
GLOBAL EARTHQUAKE MODEL

ROLE OF EARTH OBSERVATION AND GEOSPATIAL ANALYTICS

MODEL COMPONENT INPUTS

HAZARD

EXPOSURE

VULNERABILITY

MODEL VALIDATION AND CALIBRATION

LOCAL DATA

OBSERVATIONS (EVENT IMPACTS)

CHANGE ANALYSIS (E.G URBANISATION / NATURAL SYSTEMS)

OUTPUTS/ VISUALISATION

GEOVISUALISATION

RISK COMMUNICATION

INDEX CONSTRUCTION

GLOBAL RESILIENCE INDEX INITIATIVE


ROADMAP AHEAD
LAUNCH AT COP26
DEMONSTRATOR PLATFORM
FURTHER DEVELOPMENT & OPERATIONAL APPLICATION
SET-UP AND GOVERNANCE- SUMMER 2022
LAUNCH OF FULL OPEN REPOSITORY AND INDICES COP27
GLOBAL RESILIENCE INDEX INITIATIVE

Thank You!

On behalf of the Global Resilience Index Initiative Task Force
Please see https://www.cgfi.ac.uk for further details and contacts

#EO4Impact

John has nearly 30 years' experience in assessing the impacts of climate change. He has a particular expertise in the impacts of climate change on SMEs, multi-national corporates and their supply-chains and the financial services sectors (risks and opportunities); and is actively engaged on work related to the 'Task Force on Climate-related Financial Disclosures' (TCFD). He has worked extensively on country National Adaptation Plans developing the linkages between non-state actors, government and politicians to create shared agendas for policy reform. His interests include the legal implications for business, disclosure of information to investors, the mobilisation of private-sector finance, climate funding in developing countries, and the integration of adaptation/resilience into national policy making. He has a particular interest in the value of Earth Observation data and its use by the financial services and business sectors to assess climate risk and opportunities to adapt and build resilience.

John has worked on projects in Europe, Africa, North America, Latin America and the Caribbean, the Indian Ocean, the Middle East, Australia, South and South-East Asia for banks, governments, insurers, investors, development partners, and the private sector.

He was previously the co-founder and CEO of Acclimatise, which was acquired by Willis Towers Watson in November 2020.

John Firth

Senior Director

Willis Towers Watson

Open discussion

Guiding questions:

1. How can EO become the next lever in private climate finance?
2. How can the GEO community contribute to ongoing or new initiatives by the sustainable finance industry?

Summary

Closing remarks