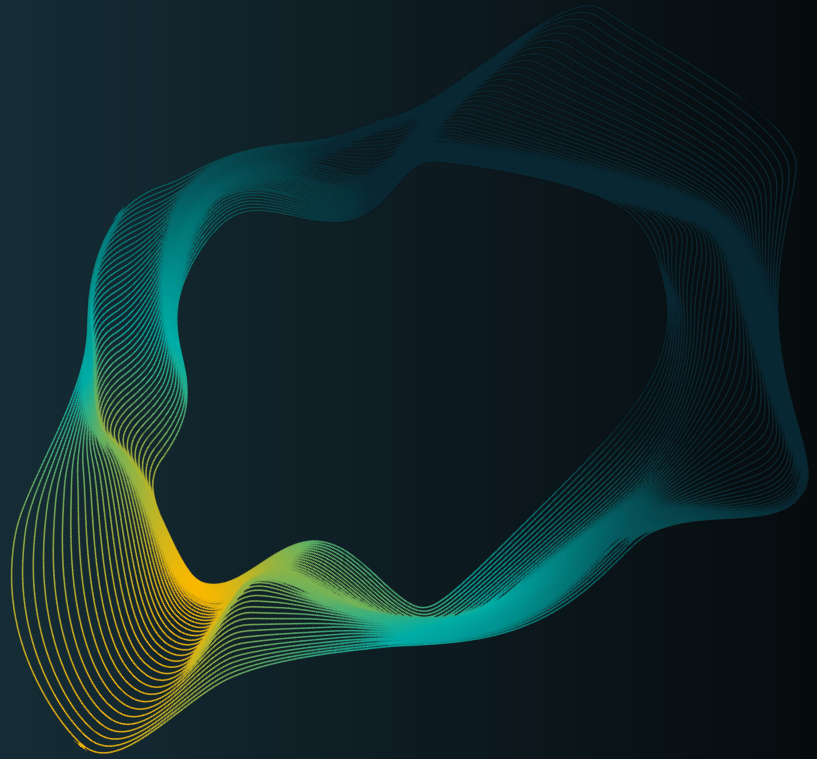
Climate Finance: Data and Data Platforms

The Climate Landscape Series



Author -
Juan Diego Martin Soto | Impact AI Strategist

February 2024

BFAGLOBAL

This **Landscape Series Deck** is based on research funded by (or in part by) the Bill & Melinda Gates Foundation. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.

Our Climate Landscape Series Decks

- **Conceptual Frameworks for Climate Action:** Climate Justice, Digital Finance and Climate Finance Flows
- **Climate Finance Taxonomies**: Frameworks for the current landscape
- Climate Change and **Gender**
- **Climate Innovation**: Climate Smart Essential Services & The Opportunity for Philanthropy
- **Climate Resilience Insurance**: Learnings, Gaps, Opportunities
- **Inclusive Climate Finance**: G2P Programs
- Building an **Inclusive Voluntary Carbon Market** for **Resilient Communities**
- **Climate Finance**: Data and Data Platforms

Executive Summary

- In September 2023 we analyzed over **50 datasets** useful to understand the status of available data in the intersection of financial inclusion and climate resilience and adaptation
    - No dataset found purely on the **intersection of climate resilience and financial inclusion**

- Most of the datasets found separately on climate, financial inclusion and adaptation had limitations: **Download, granularity** (ie: geospatial details), **frequency of update** and **data rights**

- Many of these datasets being funded by catalytic investment, should be more **easily accessible** and **follow open-data approaches**

- Promising technology trends were identified, thanks to **satellite and drones**, **ReFi** and **smart contracts**, **weather forecasts**, and **Generative AI**. All these technologies have the potential to increase frequency, coverage, reliability and utility of datasets

- Heavily data reliant applications such as **Early Warning Systems are mobilizing investment** than can help closing some of the important data gaps identified

Link to the Table with Data Landscape - The intersection of Financial Inclusion & Climate Adaptation. Detail of Data Sources

State of the art based on our analysis

The different frequency of update and granularity of datasets in the different domains makes the combination of datasets challenging

Category	Real time	Predictive data	Geospatial	Gender-data	Other granularity
Adaptation & Resilience	Limited to disasters	Many models available	Yes	No	Rural vs urban
Climate	Meteorological	Weather forecasts Other models available	Yes	No	Meteorological dimensions
Financial Inclusion	No	studies and limited models available	No	Findex database Gender programs in OCDE	Age, rural vs urban
Emissions	Near real time at country level	Many models available	Yes	No	Per industry
Agriculture	Yes	Many models available	Yes	LImited and linked to financial inclusion data	Per crop, per land use

01

Main datasets identified

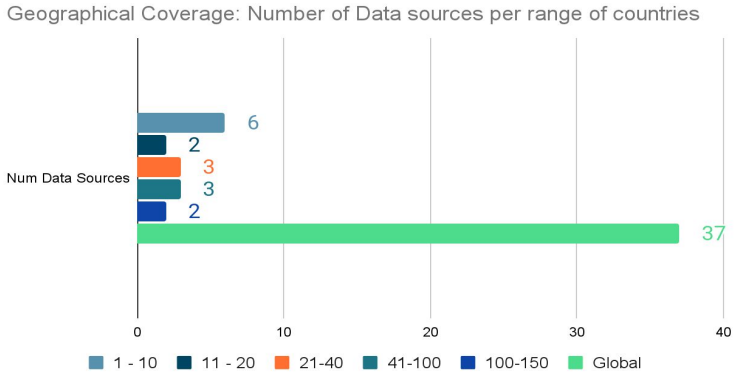
Summary of data sources

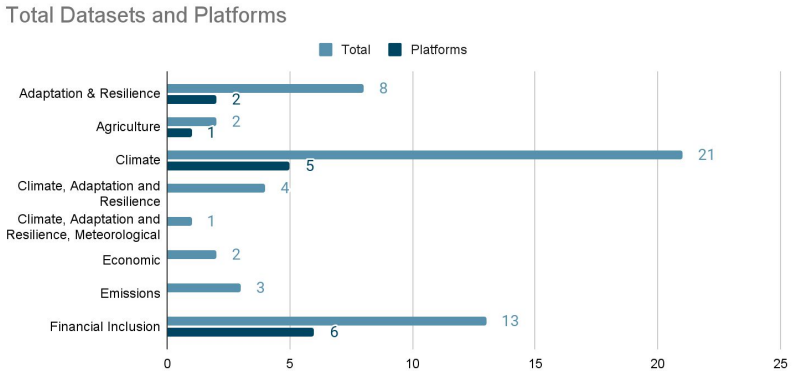
Dataset exploration prioritizing global reach, target countries: Kenya, Uganda, Tanzania, Ethiopia, India, pakistan Indonesia and Bangladesh

Data Platform: A site that allows **access and download** to **different datasets from different sources**

We identified **55** relevant datasets:

- **14** of those can be considered data platforms
- **23** have been explored in-site assessing their features
- **13** datasets have been downloaded for further exploration
- Preliminary assessment on rights restrictions for 14- only 2 allows use for commercial use





Other inventories (ie: wri) of datasets cover a broader range of data including company data and mitigation

Main datasets useful for the intersection of financial inclusion and climate resilience

Although some reports are available on the intersection of climate and finance, no specific granular information has been found

Category	Subcategory	Comments
Adaptation & Resilience	Financial Flows Loss & Damages Methodology National Plans Risk Satellite Data	OECD Financial flows based on projects and Aid activities targeting Global Environmental Objectives Most granular data on contributions among countries including description and categorizations (includes adaptation) is available Lack of availability of datasets to download, most of the information found are reports. Digital Earth Africa facilitates data use by allowing programmatic access to the data as well as examples.
Climate	Fire Modelling Meteorological Oceans Risks and disasters	ND-Index provides vulnerability readiness index on countries with good sources of projected data. Allows to define what and where to prioritize.
Financial Inclusion	Supply Side Demand Side	Global Findex Database and Databank provide detailed info from questionnaires downloadable data and advanced visualizations. GSMA has most granular data on mobile financial inclusion, but do not publicly provide it.
Emissions	NA	Global Carbon Project (GCP) provides annual updates of global and regional CO2 emissions from fossil fuels and industry, land use change, and ocean and land carbon sinks. GRACED near-real-time estimate of CO2 emissions from fossil fuel combustion and cement production, based on daily activity data.
Agriculture	NA	FAOSTAT Largest database on agriculture information. Allows access to granular data

Reports on the intersection of climate and finance

Climate Policy Initiative (CPI) provides a comprehensive view of the intersection of climate change and data

Updated report for Africa 2021

Pros

- Integrates many high quality data-sources and map information across those
- Some data can be downloaded
- Provides visualization, pivot information for all African countries.
- Includes regions, use and actor information
- Country specific reports are available, some with limited raw data

Cons

- Proprietary data sources among the information used
- Reports on trends 2023
- Last edition is from 2021
- The datasets provided as downloadable lack of granular data.
- Aggregated information is hard to consume as it is offered separately

Reports on the intersection of climate and finance

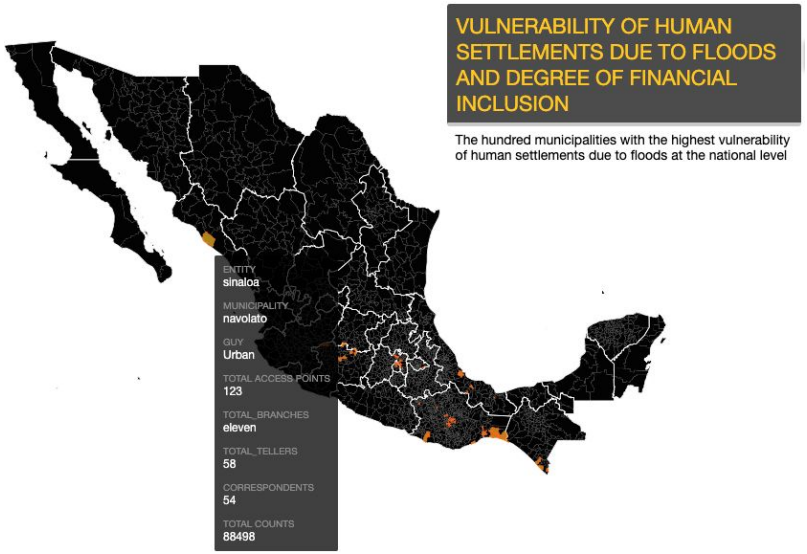
Climate Policy Initiative (CPI) provides a comprehensive view of the intersection of climate change and data

Looking at the target countries: Uganda, Ethiopia, Kenya, Tanzania, Pakistan, India, Bangladesh, Indonesia

- 2022 and 2019-2020 report on India
- Specific reports for Nigeria, Ethiopia (2022)
- Separate info for public and private climate finance for Indonesia (updated for 2021)
- No specific information found for Pakistan or Bangladesh
- No other specific report found

Report: Financial Inclusion of settlements with greatest vulnerability due to floods

Includes an analysis on Mexico and is published in Spanish



- The data approach links two dimensions:
  - Vulnerability of human settlements to floods (Atlas of Vulnerability to Climate Change)
  - Degree of financial inclusion (Citibanamex Index of Financial Inclusion, and CNBV)

- The main conclusions are:
  - **100 municipalities** with the highest vulnerability are located in **eight** states
  - **Seven out of ten** of those have low or very low financial inclusion
  - Almost **half** of them have no financial infrastructure and very few accounts and credits per adult

- The data challenges are:
  - The lack of data that link the two dimensions
  - Biases of the data sources used, such as the definition and measurement of vulnerability and financial inclusion

Climate adaptation flows: OECD

Economic flows based on individual projects

Allows to get to the most granular data on contributions among countries including description and categorizations

Categorization includes climate adaptation

Most recent update is 2022

Per country (in some cases including region) but not geo located

Migrating to a new interface (which has other interesting databases but has not yet migrated CRS

Floods, droughts,..

Climate adaptation flows: OECD

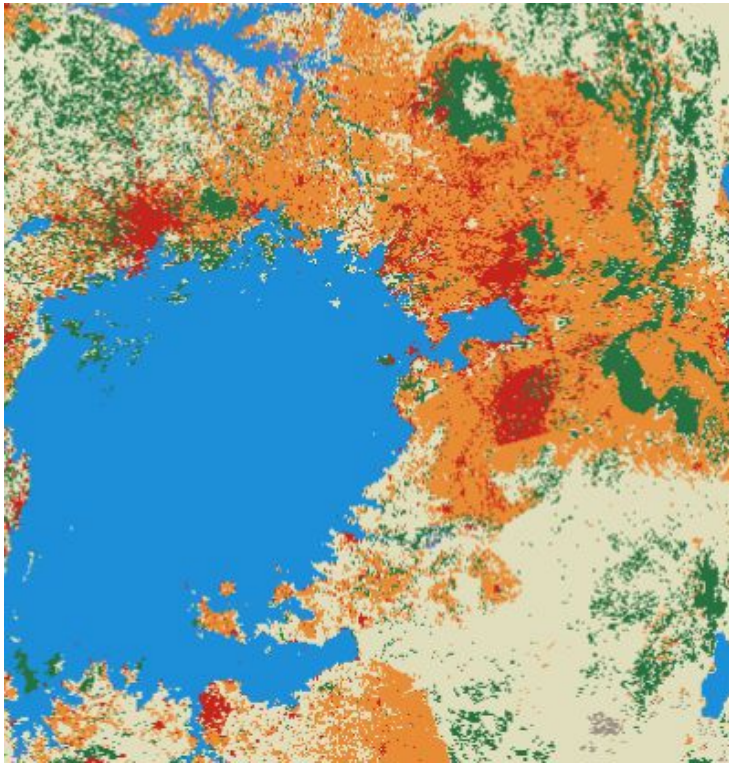
Economic flows based on individual projects

Donor	DAC members, Total
Sector	1000: Total All Sectors
Allocable	Bilateral Allocable
Marker	Climate Change Adaptation
Year	2021
Amount type	Constant Prices
Unit	US Dollar, Millions, 2021

Score / Recipient	Principal	Significant	Screened, not targeted	Not screened
Kenya	33.663	126.927	1 205.208	179.662
Tanzania	6.525	184.548	1 312.903	36.759
Uganda	21.363	163.448	1 094.002	68.181
Nigeria	3.286	101.645	1 510.230	94.506
Indonesia	523.004	508.299	2 005.398	28.005
Bangladesh	182.772	911.865	3 752.272	57.277
India	433.055	726.762	3 881.600	92.668

Adaptation and resilience: Digital Earth Africa

Provide operational service, using earth observations to deliver decision-ready products.



Resources including:

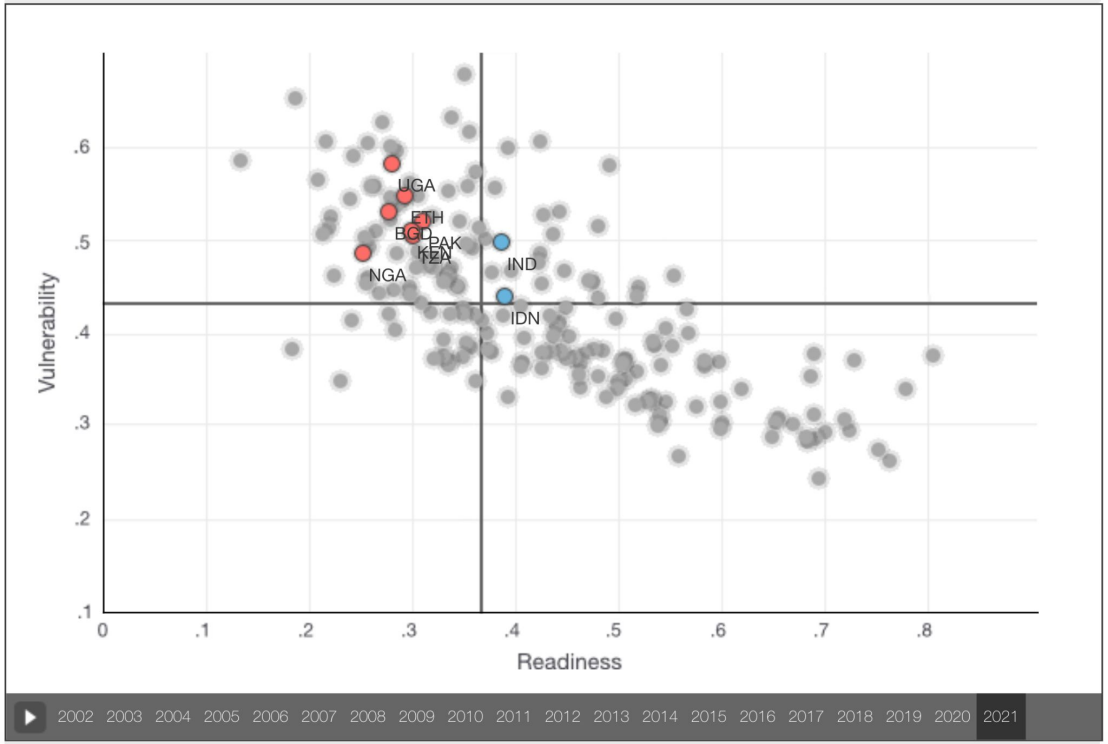
- Alternative datasets
- Advances visualization tools
  - Allowing uploading your own datasets
- Sandbox
  - Ability to programmatically act on the data
  - Pre loaded python notebooks
- Learning resources
  - Tutorials
  - Online resources

Adaptation and resilience: Digital Earth Africa

Provide operational service, using earth observations to deliver decision-ready products.

Climate Vulnerability-Readiness

Kenya ✕ Nigeria ✕ Tanzania ✕ Uganda ✕ Pakistan ✕ Ethiopia ✕ India ✕ Indonesia ✕ Bangladesh ✕



People living in the least developed countries have **10 times** more chance of being affected by a climate disaster than those in wealthy countries each year.

Historical series show some unexplained anomalies.

Source: ND Matrix

Climate Vulnerability-Readiness: ND Methodology

Provides valuable sources for Climate related risks and readiness

Incorporating among other datasets-

- Projected changes in biodiversity
- Projected biome changes
- Crop production predicted
- Annual freshwater withdrawals
- Projected sea rise impacts
- Change in warm periods
- Predicted flood hazards

Many times information is based in studies where the raw data cannot be found. Can be used to prioritize interventions.

Financial Inclusion: The Global Findex Database 2021

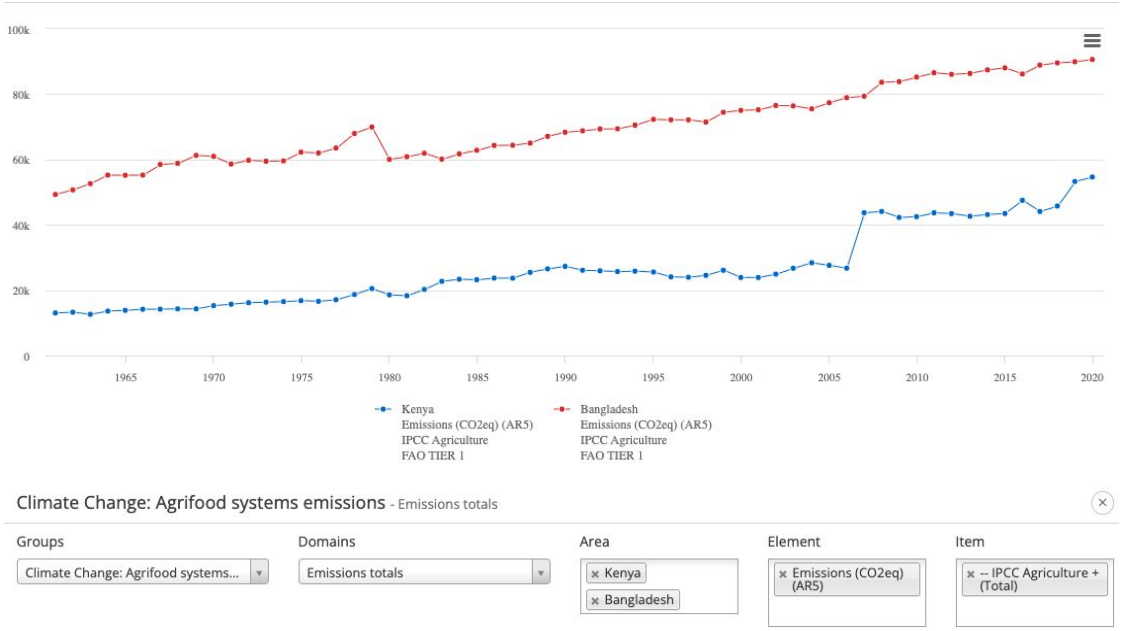
Provides detailed information on how adults save, borrow, make payments, and manage risk in over 140 countries.

- Provides demand side view, perceptions
- Provide many different capabilities
  - Interactive Dashboard
  - Download the data
  - Interactive executive summary
- Databank provides a way to explore **all the indicators of Findex Database** with a UI and download the data seen
- Available years include: **2021, 2017, 2014 and 2011**

- Lack of intra country information found
- The individual level data is said to be available but could not be downloaded as part of this exercise
- The tools provided for data exploration are slow and lack flexibility.
  - Ie: need to use pdf to integrate meaning of the fields

Agriculture: FAOSTAT

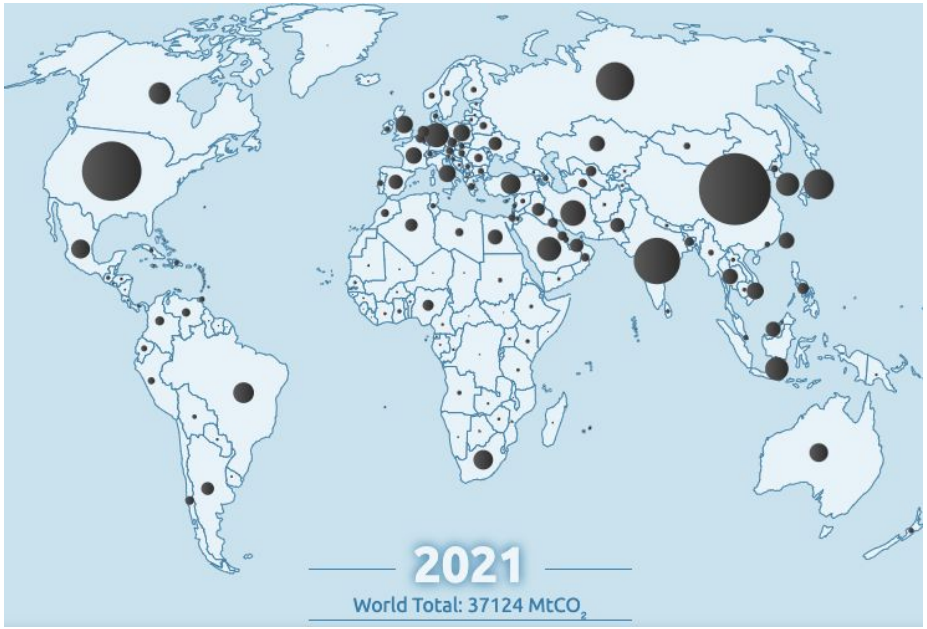
Largest database on agriculture information



- Visualization tool and access to the most granular data
- Allows filtering and preview before downloading
- Domains include:
  - Crop
  - livestock and food
  - Economics
  - Environment
  - Food security and nutrition,
  - Social
  - Methodological innovation,
  - Census of agriculture
  - Agricultural surveys
- Also include data on emissions

Emission: GRACED and Carbon Monitor

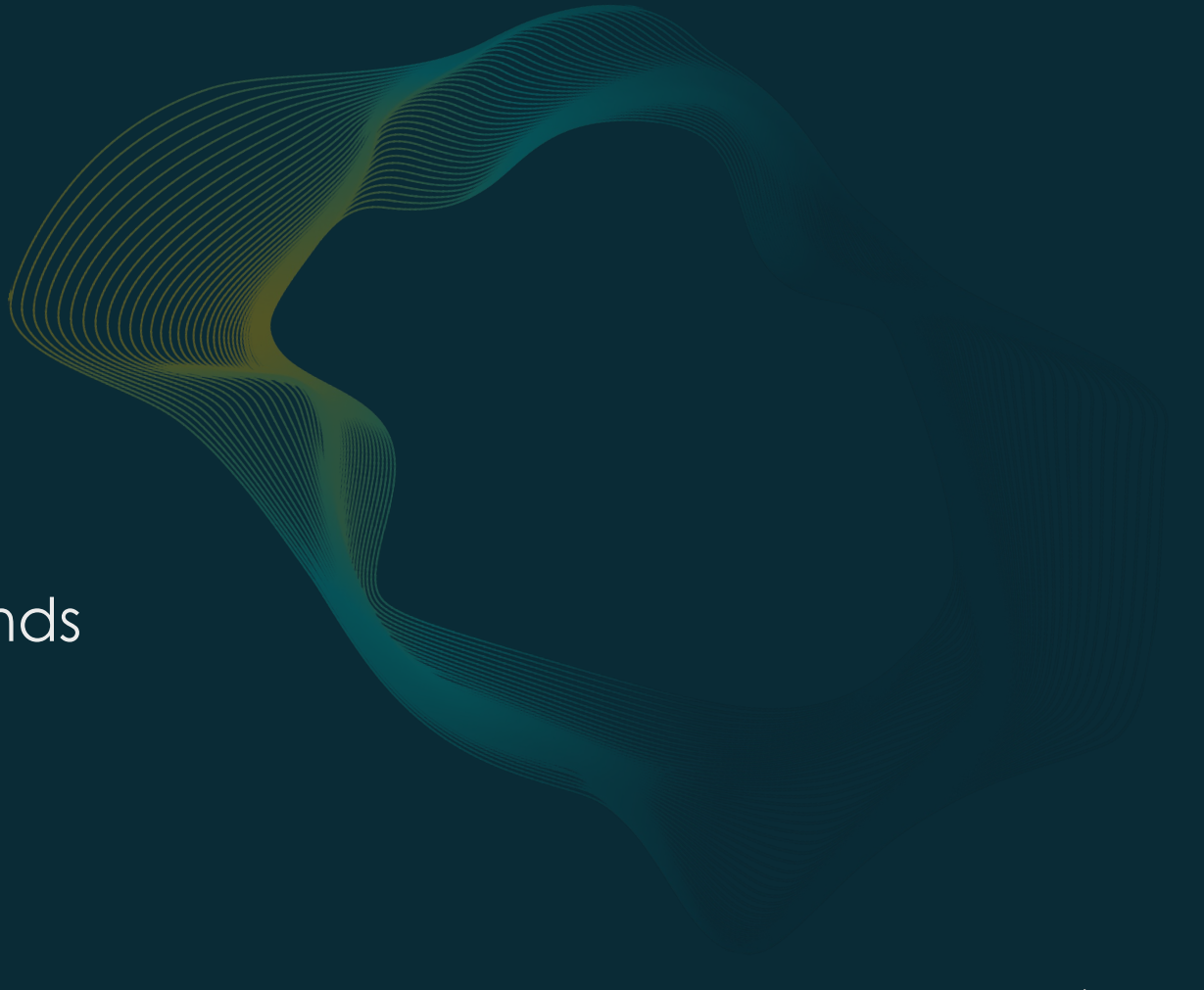
Available resources remain lacking granularity and are more focus on communication than operational use.



- Provides annual updates of global and regional CO2 emissions from fossil fuels and industry, land use change, and ocean and land carbon sinks.
- Used in the IPCC 6th Assessment report among other data
- Allows filtering of the data, and download.
- Some of the data is similar to the one provided by carbon monitor
- Lack of granularity in the main datasets, but are increasing granularity in new datasets including:
  - Cities
  - Rivers and Lakes

02

Limitations and Trends



There are important limitations in the existing datasets

Availability, granularity and location at individual level will be required to achieve full potential

- Many different repositories with limited interconnection
- Lack of common definition and standards
- Coverage varies in the different geographies
- Lack of single Ids that allows cross cutting granular information
- Data granularity
- Temporal series differ and do not integrate historical and forecasted data
- Delay & Frequency of Update
- Restrictions and T&C
  - Some supranational bodies still embracing data restriction policies

Limited interconnection

Lack of common definition

Geographical variations

Lack of single ids

Lack of granularity

Limited time series

Delay and frequency

Restriction & T&C

There are important limitations in the existing datasets

Limitations mentioned by CPI seem aligned with our findings

Domestic budget expenditures: Lack of widely accepted definition, methodology, and guidance for tracking climate finance. **No unified nor standardized databases**; limited public information on budget codes and expenditure

Lack of common definition

Lack of single ids

Private sector investments: Lack of standardized methods and reporting; **challenges of identifying and measuring adaptation finance**; limited comprehensive and consistent information at country and regional level.

Lack of common definition

Lack of granularity

Private finance mobilized: Definitional and measurement challenges; different terms and boundaries used by organizations; contingent nature of guarantees and insurance

Lack of common definition

There are important limitations in the existing datasets

Limitations mentioned by CPI seem aligned with our findings

Chinese investments /South-South Flows: Limited or no official reporting; breadth of investment actors; difficulty of tracking and understanding climate relevance and impact

Geographical variations

Disbursements: lack of data on actual disbursements of committed projects; challenges of measuring on-the-ground impact and progress; lack of climate budget-tagging

Lack of granularity

Delay and frequency

Gender-responsive climate finance: Lack of data and methodology to track and measure gender-sensitive climate finance; limited reporting by public and private actors

Lack of granularity

Delay and frequency

Skill gaps on data science

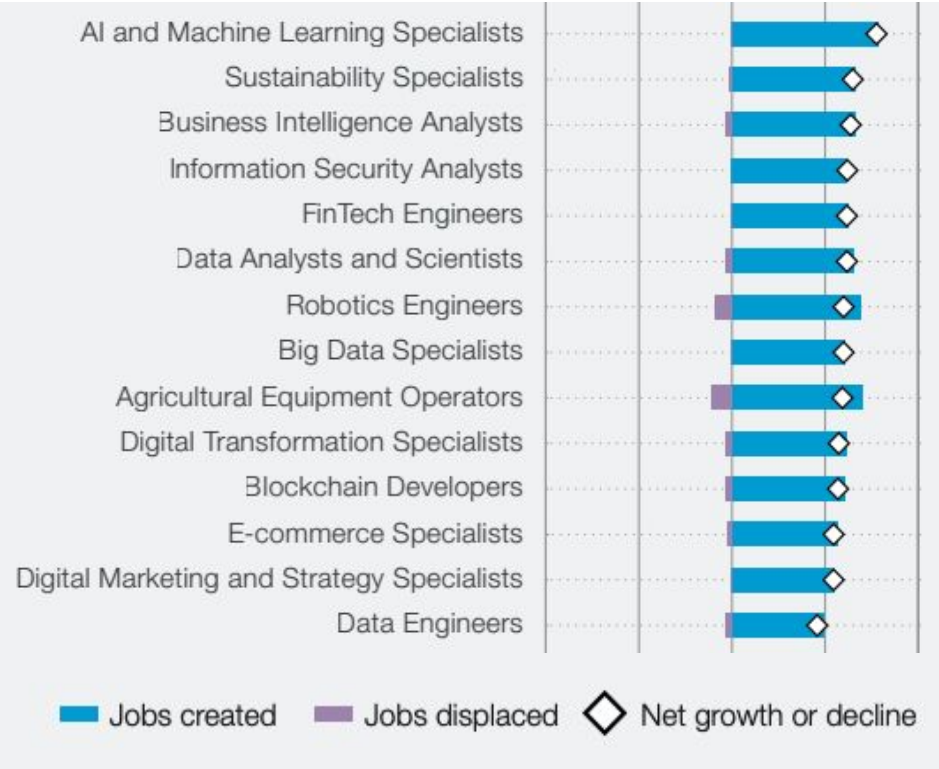
It is not only about having the data, but having the skills to work with data

The World Economic Forum Future of Jobs Report 2023 considers:

- Skills gaps are reported to be most problematic in Sub-Saharan Africa, where they are seen to limit the transformation of **70%** of companies – 11 percentage points above the global average
- In the region, Artificial Intelligence is expected to have an impact in growth creation in **18%** of the companies surveyed in the analysis, well below South Asia **(41%)** and aligned with Latin America and Caribbean **(17%)**
- Globally employers estimate that **44%** of workers' skills will be disrupted in the next five years. Cognitive skills, creative thinking and Technology literacy being the three fastest growing core skills
- The fastest-growing roles relative to their size today are driven by technology, digitalization and sustainability. AI and Machine Learning specialists top the list of fast-growing jobs.

Skill gaps on data science

It is not only about having the data, but having the skills to work with data



Source: https://www3.weforum.org/docs/WEF_Future_of_Jobs_2023.pdf

Technology trends point to increasing frequency, coverage and reliability

Technology trends show a promising landscape in order to increase data quality and extend operational usage of available data

- **Satellite Data and Drone Data** will increase precision in the coming years and allow for increased granularity and frequency
- **Digital Public Infrastructure** will enable new reliable applications and with fast time to market
- **Smart Contracts and De-Fi** will enable traceability and decentralized applications allowing for additional mechanisms to reach vulnerable populations
- **Generative AI tools** will accelerate the ability to process the data and make it operational, facilitating Data related tasks to more people

The joint progress of all the above together will accelerate the prototyping, implementation of new solutions.

Satellite and drone data progress expected

Satellite and Drone images to complement each other in early warning systems

Recent Satellite Progress

Africa: Meteosat Third Generation (MTG): **six new satellites** launched between **Dec 2022 and 2027**

- more frequent data with a full disc every **10 minutes** (versus 15 minutes)
- Screening every **2.5 minutes** vs 5 minutes
- Better resolution **500m/2km** (versus 1km/3km for MSG)

Asia Pacific: Himawari-9 replaced Himawari-8 in 2022.

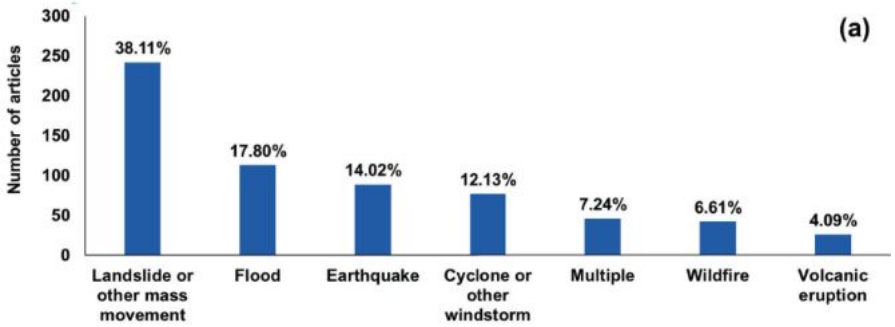
- **10 minutes** updates

China and surround areas: Fengyun-4E: To be operational in in 2023.

Success Cases:
Meridia, regtech to measure deforestation with satellites
Flooohub and GraphCast from Google

Satellite and drone data progress expected

Satellite and Drone images to complement each other in early warning systems



Mentioned usage of drones in papers per climate disaster

Drone Applications

Drone Usage in **Natural Hazard Disasters** more immediate than satellite but face weather conditions

Success Cases:

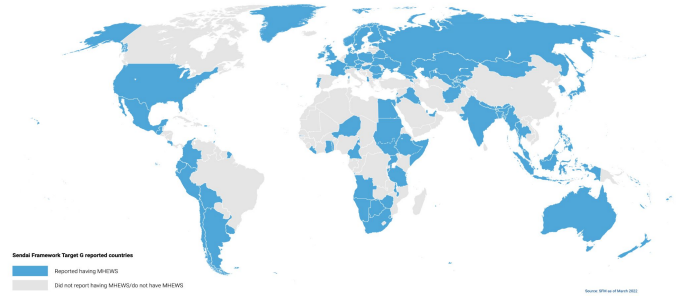
Zipline's Drones Are Delivering Blood to Hospitals in Rwanda

Drones, Reaching New Heights in Nepal's Fight Against Climate Change

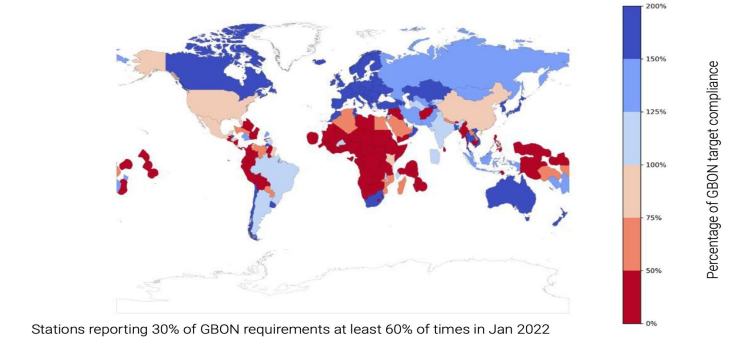
Data as an enabler for early warning systems

Satellite and Drone images to complement each other in early warning systems

Although many countries have Multi-Hazard Early Warning Systems (MHEWS)…



…Very little have a solution that is operational enough (GBON = Global Basic Observing Network)



Stations reporting 30% of GBON requirements at least 60% of times in Jan 2022

[Climate in Africa 2020] and [2022]

One third of the world population do not have access to early warning systems, increasing to 60% in Africa.

In 2020, there was an **almost 40% increase in population affected by food insecurity** compared with the previous year.

Household surveys by the International Monetary Fund (IMF) in Ethiopia, Malawi, Mali, the Niger and the United Republic of Tanzania found, among other factors, that **broadening access to early warning systems and to information on food prices and weather** (even with simple text or voice messages to inform farmers on when to plant, irrigate or fertilize, enabling climate-smart agriculture) has the **potential to reduce the chance of food insecurity by 30 percentage points**

Source: United Nations Office for Disaster Risk Reduction

Data as an enabler for early warning systems

Data is a key ingredient and present in most important challenges

Common Alerting Protocol define a protocol, message format and data dictionary for the messages

Extensive investing in observation technology through the Systematic Observation Financing Facility (SOFF)

Different initiatives around MHEWS

- The Climate Risk and Early Warning Systems Initiative (CREWS)
- Risk-informed Early Action Partnership (REAP)
- Centre of Excellence for Disaster and Climate Resilience

Platforms aiming to centralize data and resources

- Anticipation Hub include database on Evidence Database
- Risk Information Exchange includes open-source global, regional, and national risk information

Data as an enabler for early warning systems

Data is a key ingredient and present in most important challenges

Gaps mentioned in the report:

Weather observation: One third of the countries do not have monitoring capacity for cumulative or simultaneous hazards. Important gaps in Global Basic Observation Networks (GBON) in Africa and certain regions of the pacific and Latam

Risk knowledge: The pillar on risk knowledge has seen the least progress with significantly low scores across all the regions

Data availability: Data granularity (disaggregated data) is required to target segment populations: ie: gender, age, location

Weather data and forecasts as a DPI?

Weather primitives would be a necessary complement to ID/Financial ones to build Climate DPIs

- **Early warning systems** are a particularly promising use case for a Weather Forecast DPI
  - Other use cases: farmer advice, agricultural policy, hyperlocal business applications

- It will allow to availability to access but to **extend the DPI reach**, it still lacks
  - A financial transaction (although UCIs has some experience with this)
  - Executing smart contracts would be valuable, for instance for parametric products

Attributes of Ideal DPI (*HBR*)	A Weather DPI would fulfill many of these characteristics
1. Enabling the SDGs	1. SDG 13 on Climate Action
2. Inclusive	2. Would cover the whole planet and all humans
3. Human-centric	3. Can serve specific needs of any individual, we all depend on the weather!
4. Trustworthy	4. Highest security and reliability, models now are well performing
5. Supportive of Innovation	5. Open to better models and supporting multiple use cases
6. Interoperable	6. Yes as it is digital
7. Resilient	7. Yes, depending on the implementation
8. Politically Viable	8. Smart contract would not need political involvement

Opportunity with early warnings for all?

Weather primitives would be a necessary complement to ID/Financial ones to build Climate DPIs

Four pillars

- Disaster risk knowledge and management (UNDRR)
- Detection, observation, monitoring, analysis, and forecasting (WMO)
- Warning dissemination and communication (ITU)
- Preparedness and response capabilities (IFRC)

UN Consortium to cover everyone on Earth by 2028

Will need something akin to a Weather DPI at its core

Maybe of interest to the Foundation's AgDev team?

Emerging Regenerative Finance (ReFi) Initiatives

Fresh thinking, top talent and new tech primitives for climate and inclusion applications.

Climate Collective

Climate Collective (a CIFAR Alliance Member) and a few of its members:

- Pilot project on direct payments for ecosystem services with GoodDollar and Appropriate Design.
  - Allows direct payments using CELO crypto currencies

GainForest

- Allows to donate to a nature project, local players monitor impact on Biodiversity
- Technology works on satellite, drone and field data as a backup

reseed

ReSeed

- Data Collection from small farmers using mobile phones to allow them to access the carbon markets. 8,000 farmer partners now, aiming to reach millions by 2030

Generative AI will accelerate and facilitate the access to data

Fresh thinking, top talent and new tech primitives for climate and inclusion applications.

Report analysis, interpretation and structuring information can be highly automatized -
1) Using Bing with Open AI
2) OpenAI API & Extensions

Extension of no-code and low-code tools will make integrations easier possible

Models able to run locally provide additional opportunities to fill the knowledge gap in Early Warning systems

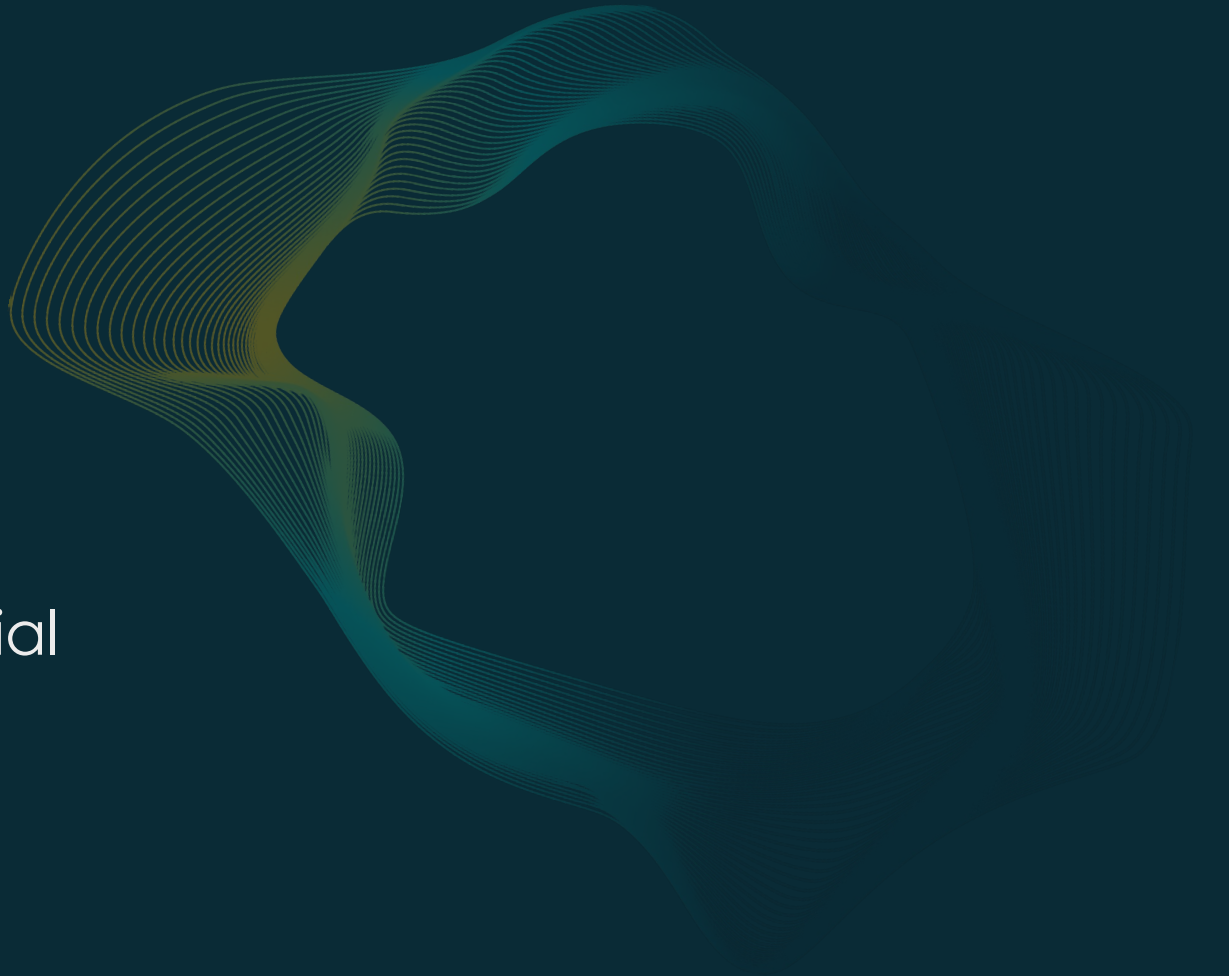
Data analysis, exploration and visualization will become accessible to a bigger audience thanks to the use of Natural Language to interact with the data
1) Code Interpreter integrated in GPTs

Data download and routine data processing tasks can be automatized
1) Autonomous agents

LLMs for coding (ie codex, Co-Pilot) accelerate code creation and make prototyping available to non-developers

03

Technology Potential



How will these technologies help solve existing limitations?

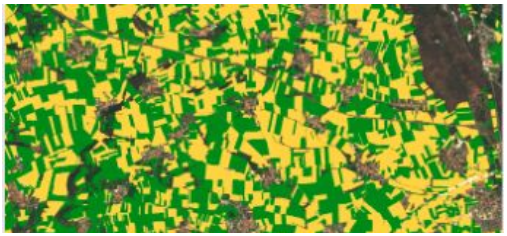
Technology trends show a promising landscape in order to increase data quality and extend operational usage of available data

	Gen AI	Satellite & Drone	DPI	Autonomous Initiatives
Many different repositories with limited interconnection	YES	NO	YES	NO
Lack of common definition and standards	YES	NO	NO	NO
Coverage varies in the different geographies	NO	YES	NO	NO
Lack of single Ids that allows cross cutting granular information	NO	NO	YES	NO
Data granularity	NO	YES	NO	YES
Temporal series available differ and do not integrate historical and forecasted data	YES	YES	NO	NO
Delay & Frequency of Update	NO	YES	YES	NO
Restrictions and T&C	YES	NO	YES	YES

Generative Ai tools will accelerate the spread of the solutions and facilitate data related tasks to less technical people.

Promising initiatives at the startup level

Data startups aim to solve the data problems related to Climate Adaptation



Amini

A holistic solution, utilizing AI and space technologies at scale to drive systemic change and promote economic inclusivity for farmers and supply chain resilience across Africa and beyond.

Dclimate

Products include: Data marketplace, physical risk tool for corporates, and API. The marketplace contains free and paid third party datasets. More focus on tourism, but using cutting edge data technologies

Our Climate Landscape Series Decks

- **Conceptual Frameworks for Climate Action:** Climate Justice, Digital Finance and Climate Finance Flows
- **Climate Finance Taxonomies**: Frameworks for the current landscape
- Climate Change and **Gender**
- **Climate Innovation**: Climate Smart Essential Services & The Opportunity for Philanthropy
- **Climate Resilience Insurance**: Learnings, Gaps, Opportunities
- **Inclusive Climate Finance**: G2P Programs
- Building an **Inclusive Voluntary Carbon Market** for **Resilient Communities**
- **Climate Finance**: Data and Data Platforms

Thank you!

Juan Diego Martin Soto

www.bfaglobal.com

info@bfaglobal.com

@bfaglobal

BFAGLOBAL