

Taking forward the G20 Sustainable Finance Roadmap:  
**Improving climate risk assessments and finance for biodiversity**



**REPORT**

# Improving Sustainable Finance Implementation

Improving climate risk assessments and investment flows to biodiversity and adaptation: Steps for policy makers

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# 1 Summary for sustainable finance policy makers

## Summary of six months of workshops with key stakeholders

### Sustainable finance policy makers can take further steps in stimulating implementation of the G20 Sustainable Finance Roadmap priorities for climate and biodiversity goals

- **Six months of workshop consultations** were held to explore how to better achieve the goals of sustainable finance policy, through future improvements in financial sector climate risk assessment and consequential financial decision making, by incorporating material data on natural assets in chronic and acute physical climate risk assessments.
- This aimed to contribute to taking forward Actions 7, 8 and 10 (decision-useful information) and 11 and 12 (risk assessments) of the [G20 Sustainable Finance Roadmap](#) to better enable risk, dependencies or impacts on climate and nature, including biodiversity, to be mainstreamed into financial decision-making.
- **130 public, private and CSO stakeholders** were engaged, starting with an initial workshop introduced by **Dr Ma Jun**, and co-hosted by TNFD Co-chair, **David Craig**. These assessed the opportunities, needs and on-going activities to improve risk assessment.

The results are as follows:

### For improving assessment of climate risk and consequent financial decision making

1. A significant body of climate risk assessments and consequent financial decisions concerning **capital allocation and risk management can be improved** by better incorporating data on natural assets – e.g. risks from coastal flooding, riverine flooding, freshwater scarcity (see Box 1, below).
2. Without these improvements, capital may continue to be mis-allocated, risks unmitigated, economic gains unrealised and insurance cover against natural disasters underdeveloped.
3. Sustainable finance policy makers can stimulate action on the development of improved climate risk assessment, by requesting key stakeholders, including international organisations (IOs) and international financial institutions (IFIs) to take the steps summarised here.

### For increasing financial flows to natural assets, climate adaptation and biodiversity

1. The economic value of the natural assets which mitigate physical climate risks (e.g. mangroves, reefs, forests – see Box 1) are very often **undervalued and not substitutable**, as acknowledged by the NGFS in a [foundational publication on nature-related risks](#). One reason for that is that the value of their risk mitigation is not captured in financial decision-making. As a result, they are under-invested, often leading to their loss or degradation.
2. Actions to incorporate data on natural assets into climate risk assessment is one route by which nature's economic and financial valuation can be directly increased. This creates investable opportunities and **can facilitate financial flows into nature, biodiversity and climate adaptation initiatives**.
3. Sustainable finance policy makers can stimulate action to incorporate the value of these natural assets and biodiversity into climate risk assessment, and so increase future investment, by requesting key stakeholders, including international organisations (IOs) and international financial institutions (IFIs) to take the steps summarised here.

## Sustainable finance policy makers can promote actionable steps in three areas

- Delivery of the sustainable finance agenda, including G20 Roadmap goals, can be improved by practical actions to exploit identified potential synergies between indicators, metrics and data used in climate and nature financial analysis.
- The clearest synergies have been seen in improving climate risk assessments, where benefits for accuracy of climate risk assessment and investment flows to nature can be realised by parallel developments in three areas:
  1. **Modelling of vulnerability to climate risk**
  2. **Provision of material data for climate risk modelling**
  3. **Capacity building of decision makers and scaling**
- The potential benefits arise because climate and nature are two interacting systems that affect each other through a variety of feedback loops. For instance, the scale of the impacts of certain climate risks, such as flood damage or freshwater scarcity, are mediated by the local state of nature, such as mangroves, reefs and forests. These mutually reinforcing feedback loops between climate and nature have been acknowledged by the [NGFS](#) and the [Coalition of Finance Ministers for Climate Action](#).
- The financial significance of this mediation by nature is now beginning to be **reflected in financial sector climate risk assessments** but it needs to **improve in maturity and scale**. However, the state of nature is not typically an isolated model component within climate or catastrophe risk or modelling. A modular approach which splits out nature vulnerability within a calculation, as part of the vulnerability component, will facilitate better understanding and quantification of nature's risk and mitigation capability. This modular approach to vulnerability is something which leading risk modelers,

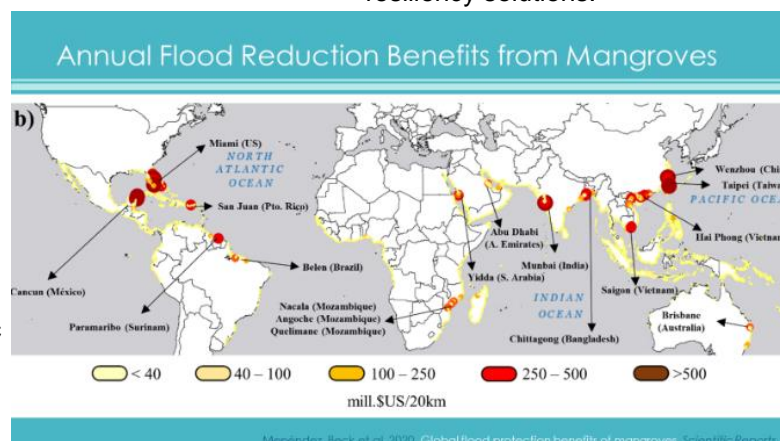
### Box 1: How biodiversity and nature mediate climate risks – two examples

**Coastal flood risk assessments benefit from integrating data on coastal wetlands** such as mangroves, reefs and marshes. Research shows that wetlands can decrease coastal property damages for storm flood events by around 20% ([Lloyd's](#)). Integrating data on coastal wetlands in flood risk models enables more granular risk assessments that allow for new financial and insurance products. Benefits can include enhanced insurance coverage or mortgage costs. The value of risk reduction benefits further enables investable opportunities into the conservation of natural assets.

**Freshwater scarcity risk assessments can benefit from integrating data on water resources and ecosystems.** Research by [HSBC and University of Cambridge](#) show the materiality of freshwater risks, which can increase the risks of investment grade corporate bonds to speculative ratings. Assessments of surface and groundwater resources and ecosystems in water catchment areas can help predict water stress and manage risks. In future, reported data on water withdrawals and ecosystem data help companies understand their exposure to freshwater risks and provide opportunities for bankable investments into natural resiliency solutions.

Example: Global relevance of mangroves to coastal flood risks.

Source: Mike Beck, UCSC Center for Coastal Climate Resilience.

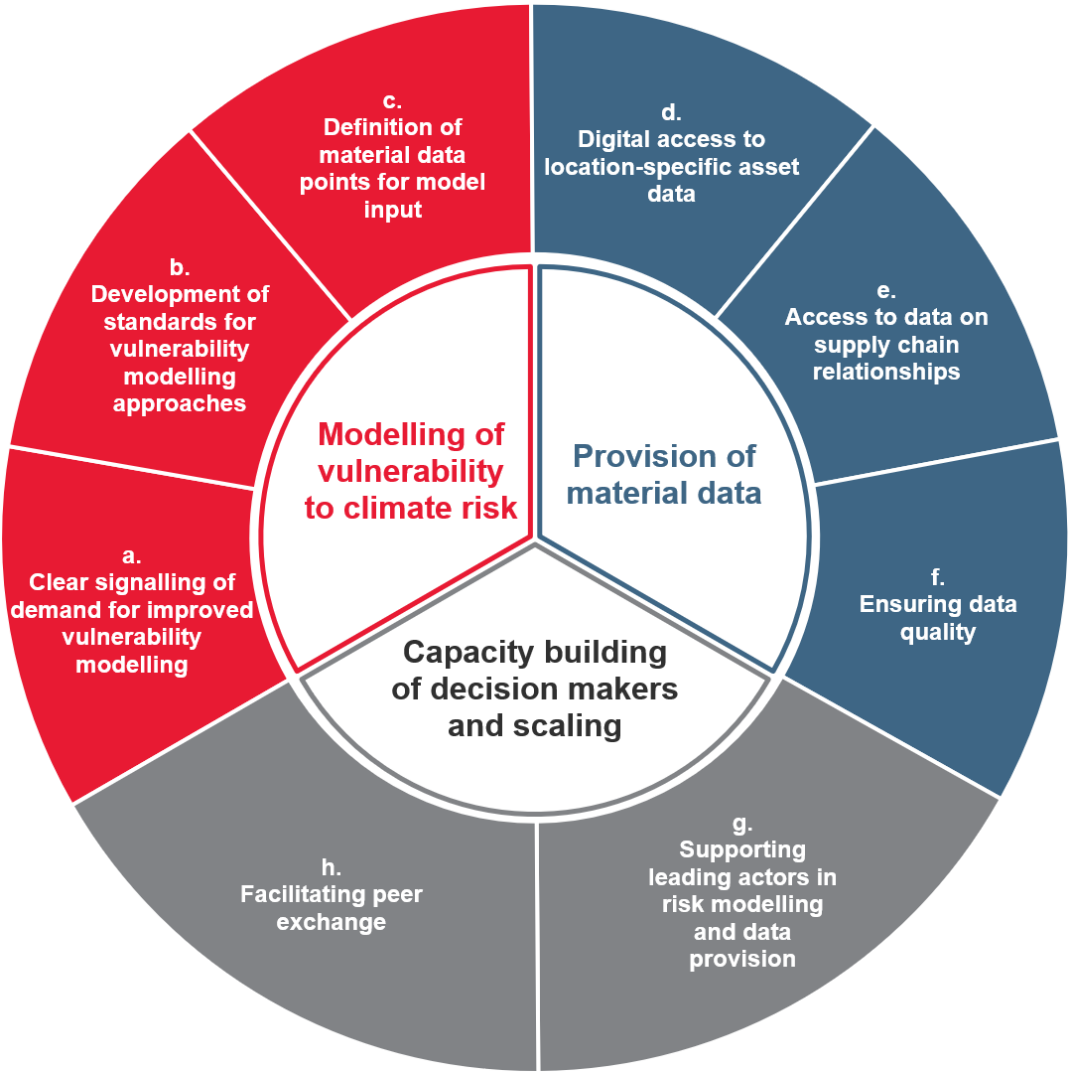


including insurance stakeholders, or [OS-Climate](#) advocate for, the latter within an open source physical climate risk & resilience programme. Central banks have started exploring this link in the NGFS Nature Taskforce. This workstream includes research on such climate-nature synergies in their [2022-2024 work program](#). Further findings on vulnerability modelling are provided in section 2 of this document and in sections 2 and 5 of the report of the [initial workshop](#).

### Summary of Actions

- The figure below indicates the actions which can be taken in each of the 3 areas. These are then described on the following pages.
- In each of these action areas, the role of sustainable finance policy makers appears to be to stimulate action by requesting key stakeholders and international organisations to work together on the steps.
- The key stakeholders identified during stakeholder engagement are noted in the following text.

Figure 1: Summary of actions to enhance climate risk assessments and increase investments into climate adaptation and nature



**1. Action Area 1: Modelling of vulnerability to climate risk**

Vulnerability models incorporating the material influence of natural assets are currently being developed by specific financial stakeholders (for example, insurance risk modellers or OS-Climate) in ways which show the feasibility and value of improved vulnerability modelling in climate risk assessments. They identify risk-mediating benefits of natural assets and quantify their effects for different climate risks.

More detail on leading practices can be found in briefing: [“Delivering on the G20 Sustainable Finance Roadmap”](#).

Identified, feasible steps can be taken for these improvements to further develop and become mainstreamed widely into relevant financial decision-making. Those steps are described here, with identification of key actors and the specific role of policy makers:

Step needed	Key Actors	Route to achievement	Role of Policy makers
a. <b>Clear signalling of demand for improved vulnerability modelling</b>	<p><b>Insurance industry</b> (e.g. AXA, Lloyd’s, Renaissance Re, Geneva Association, GuyCarpenter, AON)</p> <p><b>Financial institutions</b> (banks, e.g. BNP Paribas, asset managers, prv. equity)</p> <p><b>Central banks and regulators</b> (e.g. ECB, BdF, DNB, BoE, NGFS, FSB Climate Vulnerability and Data (CVD) workstream)</p>	<p>Leading industry players convene key risk modellers to form common view on future qualities of vulnerability modelling required for including vulnerability in future risk models</p>	<p>Request and convene leading and key actors to discuss future vulnerability modelling needs</p>
b. <b>Development of standards for vulnerability modelling approaches</b>	<p><b>Climate risk model users</b> (as above)</p> <p><b>Risk modellers</b> (incl. KatRisk, Oasis LMF, AIR, RMS, Fathom)</p> <p><b>Organisations curating modelling standards</b> (e.g. Oasis LMF, OS-Climate, NGFS, <a href="#">IMF FSAP</a>, academia)</p>	<p>Leading model developers discuss and agree on appropriate standards in vulnerability functions (incl. model transparency, compatibility)</p>	<p>Request model developers and standard curators to develop vulnerability modelling standards for better uptake, market penetration and collaboration</p>
c. <b>Definition of material data points for model input</b> (Note)	<p><b>Climate risk model users and modellers</b> (as above)</p> <p><b>Providers of nature-related and ESG data</b> (as convened by Nature-related Data Catalyst of TNFD)</p>	<p>Model developers and providers of data on natural assets need to exchange on currently and potentially available data points for use in risk and vulnerability modelling, to match future models to future data provision</p>	<p>Request risk modellers and data providers to exchange on future model inputs, e.g. in a process similar to the Data Catalyst of the TNFD</p>

**Note:** Decisions on the data to use in modelling, and the future direction of model development, depends in turn on the near-term availability of the material data. Whilst significant progress can be made with available data, exchange is needed between potential data suppliers and model developers on what future data would be valuable and could be provided.

## 2. Action Area 2: Provision of material data

In parallel to the development of modelling and the identification of the relevant data points, a pipeline for future delivery of that material data, at adequate levels of quality and format, needs to be established.

Foundational work on data gaps and provision has already been put forward by the NGFS in the 2022 [Final report on bridging data gaps](#). This and further existing initiatives and best-practices on the generation and access to global data provide clear insight into the steps needed to support near-future provision of material nature-related data at sufficient quality and integrity. These steps are as follows:

Step needed	Key Actors	Route to achievement	Role of Policy makers
<b>d. Digital access to location-specific asset data</b>	<p><b>Leading climate risk model and data users</b> (as above, incl. public, central and commercial banks, insurers, asset managers)</p> <p><b>Providers of geo-spatial asset data and relevant standards</b> (e.g. specialised geo-spatial data providers, such as Spatial Finance Initiative, Jupiter, and sust. Rep. standard providers, EFRAG, ISSB, GRI, TNFD)</p> <p><b>Solution providers for secure and digital data access</b> (e.g. NZDPU, OS-Climate Data Commons, EU Single Access Point, NGFS Climate Data Dir.)</p>	<p>Agreement of common, interoperable standards for asset ID and geo-location tools, by leading financial user-groups and data-providers</p> <p>Agreement by IFIs, MDBs, central banks and public initiatives holding geo-specific asset data to use these standards to allow data pooling or enhanced data sharing</p>	<p>Request and convene financial user-groups and providers of geo-spatial data to agree on appropriate standards</p> <p>Encouragement of sharing of location-specific asset-level data by businesses and financial institutions, e.g. through sustainability reporting</p>
<b>e. Access to data on supply chain and investment relations</b>	<p><b>Solution provider for supply chain data</b> (CDP, OS-Climate Data Comm.)</p> <p><b>Organisations enhancing supply chain data</b> (e.g. sectoral initiatives, Open Supply Hub, Source Map, EON Group, trade digitisation, WBCSD's PACT; IMF, OECD, WB, BIS, in G20 transition finance framework project)</p>	<p>Removal of disincentives for confidential sharing of data on supply-chain and investment relationships, through creation of appropriate rules and standards for trusted and secure data access</p> <p>Interoperable standards for traceability in products' value chains</p>	<p>Request supply chain solution providers to agree on needs, governance and tech-infrastructure for secure and privacy-compliant data accessibility, based around best practice.</p>
<b>f. Ensuring data quality (incl. incentives for data generation, curation, verification)</b>	<p><b>Solution providers for secure and digital data access</b> (as above)</p> <p><b>Data users</b> (as above)</p> <p><b>Data providers</b> (for sustainability and supply-chain and geo-located asset data)</p>	<p>Businesses and 3<sup>rd</sup> parties generating data have a direct route to make data available for reward to wider data users in the financial system, and high data quality, integrity and verification is rewarded</p>	<p>Request relevant stakeholders to agree on governance and incentive structures to secure high-quality data set generation and access.</p>

**Feasibility of these steps:**

For each of these actions, solutions have already been explored and tested in different contexts. For example:

- The **WBCSD-convened [Partnership for Carbon Transparency](#)** (PACT) is supporting businesses and organisations in understanding their supply chain scope 3 greenhouse gas emissions. The PACT-developed Pathfinder Framework allows to integrate otherwise incompatible GHG emission data along the whole value chain. It provides transparency on GHG emissions to financial institutions that aim to understand their supply chain climate change impacts.
- **Icebreaker One** has gained extensive experience on trusted data architecture solutions, with applications in the UK energy and banking system. Recent work on [Open Net Zero](#) is exploring a trust framework to enable net zero sustainability data can flow from companies to data users.
- With the [Data Commons project](#), **OS-Climate** aims to enhance global access to decision-useful sustainability data by developing an open source sustainability data “library of libraries”. Through its data exchange, the Data Commons will enable secure and easy access to open data and to data based on licensing access controls. It will also enable the flow through of confidential data from discloser to end user, allowing a discloser to set permissions for which specific entity (e.g., lender, regulator, assurance provider) can access that data.

**3. Action Area 3: Capacity building of decision makers and scaling**

Increasing the capacity of financial decision makers to understand the material relevance of vulnerability and biodiversity in their decisions is a further key aspect of increasing the demand for improvements in modelling. There is a ‘virtuous circle’ – improvements in risk modelling will make it easier for ESG analysts to use material data on the state of nature in their analysis. Relevant steps are:

Step needed	Key Actors	Route to achievement	Role of Policy makers
<b>g. Support leading actors in risk modelling and data provision</b>	<b>Leaders in climate risk modelling</b> (including those above)	Leading and interested institutions convene to define design characteristics on which further research and action can be based, share best practices and success stories	Encourage leaders to share and deepen knowledge on modelling and data provision in relevant fora
<b>h. Facilitate peer exchange</b>	<b>Climate risk modellers</b> (as above, e.g. NGFS for central banks)	Develop leading practices in vulnerability modelling for climate risk assessments, which can stand as proof of concept for wider financial institutions and insurers.	Encourage leading financial institutions to take the first steps in development and use of vulnerability functions, to create standards for the wider financial actors

### Overview of outcomes

Steps in the three action areas described above are complementary activities, all of which are necessary for improving the flow of data for financial decision making.

The two charts in Figure 2 below illustrate the relevant flow of data, the actors involved and the relationship of the outcomes from these steps.

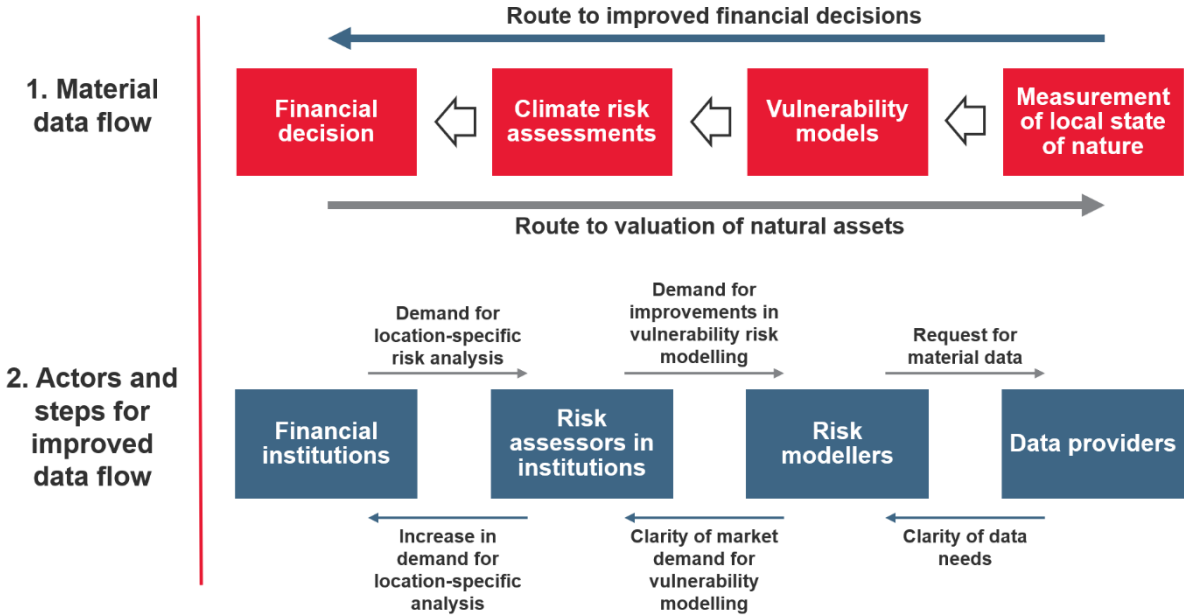


Figure 2: Data flow needed for enhanced climate risk assessments using nature-related data (1.) and 2. Steps needed by actors in the assessment chain, to enable that data flow.



## 2 Further clarification and description of steps

### More detailed findings from the six months of stakeholder engagement

This section provides more detailed information gathered from a total of 130 stakeholders in a series of six workshops over a period of six months, in which two use cases were explored in detail, focussing on risk assessments of coastal flood risk and freshwater scarcity. Participation in the workshops is detailed in section 3.

The information here is presented to guide understanding of the nature and size of benefits of action and the potential role of policy makers.

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### Identified benefits from improving climate risk assessment with nature data

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- **Integrating nature in climate risk assessments could decrease costs for capital and insurance.** Businesses and financial institutions can decrease financial risks and insurance costs by protecting natural capital that mediates climate risk. Research of the insurance industry shows that coastal wetlands could decrease property damages through storm floods by around 20% ([Lloyd's](#)). Where nature's contribution for disaster risk reduction has been quantified and deemed material, communities, businesses and financial institutions may benefit from improved financing conditions or insurance coverage.

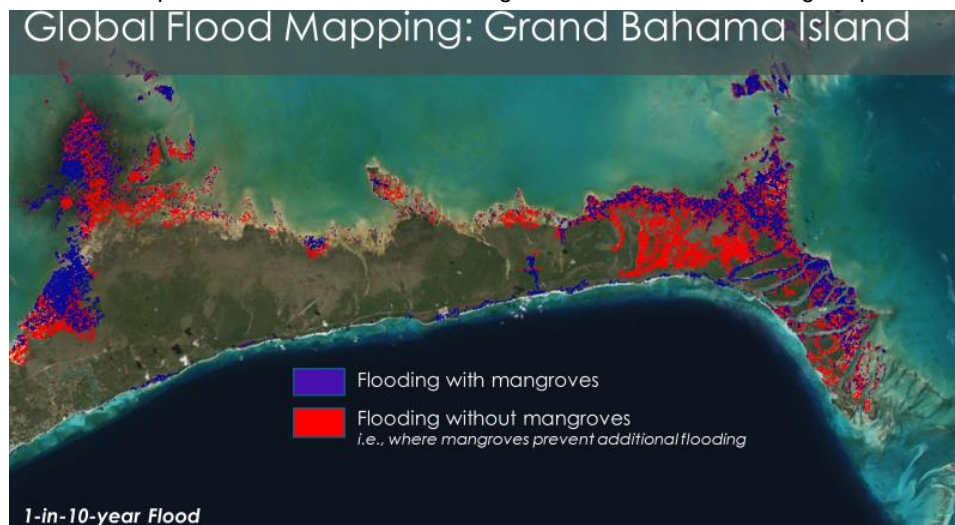
Organisations known to be working on this: Lloyd's Tercentenary Research Foundation, RMS, GuyCarpenter, Oasis LMF, The Geneva Association

- **Nature's valuation in climate risk assessments generates investable opportunities.** Initial calculations show that the protective value of nature against climate risks can be quantified and provides a positive return. According to [Beck and Reguero et al. 2022](#), benefits can exceed costs by more than 15:1. This provides an opportunity for investments into nature-based resilience projects.

Organisations known to be working here: UCSC Center for Coastal Climate Resilience, World Bank, IMF, NGFS

- **The insurance protection gap is growing due to climate change.** Insurance availability and affordability are key policy goals for developing and developed economies alike. With a changing climate, achieving these policy goals continues to be a challenge – **in 2022, out of \$313 billion global economic loss associated with natural disasters, only \$132 billion was covered by insurance** ([Aon](#)). Quantifying where nature contributes materially to extreme weather disaster risk reduction can help policy makers and re/insurers address some of this challenge.
- **Nature can help mitigate against physical impacts of climate change.** Climate change exacerbates extreme weather risks. Across all extreme weather events, climate change increases impacts on people, communities and economies. Natural assets can play a material role in reducing extreme weather impacts, as shown in numerous studies (e.g. [Nature](#), [Nature](#), [The Geneva Association](#), [The Geneva Association](#), [World Bank](#), [World Bank](#), [Municipal Natural Assets Initiative \(MNAI\)](#) et al., [Insurance Bureau of Canada \(IBC\)](#) et al., [TNC](#), [Munich Re et al.](#)). This valuable contribution of nature needs to be adequately assessed and be factored into climate risk modelling and risk reduction decisions.

Figure 3: Illustrative example: Natural assets such as mangroves decrease flood damage exposures



Source: Mike Beck, UCSC Center for Coastal Climate Resilience, slide from workshop presentation.

## How sustainable finance policy makers can make a difference

- Policy makers have a key role to play in signalling the value of stakeholder actions and the future direction of progress in sustainable finance, noting the apparent synergies between steps in this area and the priorities, mandates and work programmes of multi-lateral sustainable finance fora (in particular, the NGFS and FSB, but also the G20 SFWG or Int. Platform on Sustainable Finance).
- The actions required for progress on the climate risk assessment use-cases appear likely to facilitate further successes in implementation of sustainable finance work programmes:
  - the development of solutions for improving data for geo-located risk modelling, applicable to investment and supply-chains, will be valuable for wider purposes.
  - tools and standards developed in this area (including for the financial valuation of biodiversity/natural assets and related climate adaptation projects) appear likely to facilitate the wider goals of increasing sustainable finance flows and development of financial products.
  - stimulating activities which use the synergies between climate and nature sustainable finance should enhance successful outcomes from these parallel agendas, whilst reducing duplication, dilution of effort and likely future dissonance.
- Policy makers' essential leadership role is to encourage vanguard organisations to further develop solutions and tools, to be taken up by leading actors, standardised and later mainstreamed. In areas like the improvement of climate risk assessments, informed users and data providers see the direct benefits of innovation, but leadership is required to overcome inertia in the system of existing practice.
- Transition is often best achieved through practical, leadership action in small areas where a defined community of financial actors recognises benefits, has interest and expertise, to develop solutions which could then be mainstreamed and form a solid basis for future policy change.
- Sustainable finance policymakers can call for coordination of efforts across relevant expert communities, including data providers, data standards and metrics developers, risk modellers and user groups and joint practical research.

Key stakeholders in this area: OECD sustainable finance and biodiversity work, NGFS Nature Task Force, IMF, World Bank, FSB Climate Vulnerabilities and Data (CVD) workstream, Oxford University.

- The following tables are designed to help guide action by summarising the findings on needed action and their rationale for each of the steps raised by stakeholders. In addition, the key stakeholders known to be already engaged in making progress are mentioned, to enable their future engagement.

## 1. Modelling of vulnerability to climate risk

### a. Clear signalling of demand for improved vulnerability modelling

Actions, Findings and Explanation	Engaged key stakeholders
<p>1. <b>Financial institutions demand global climate risk assessments with supply chain coverage.</b> Supply chain disruption through climate risks is a blind spot for many financial institutions. To assess portfolio exposures and manage supply chain climate risks, financial institutions require information on companies' supply chain data.</p>	<p>HSBC, University of Cambridge Institute for Sustainability Leadership (CISL), CDP</p>
<p>2. <b>Users of climate risk models need to articulate demand for the inclusion of this concept in risk modelling and data provision.</b> Risk model developers and data providers react to market signals. Risk model users, including financial institutions, insurers and central banks, need to raise the topic with data and modelling institutions they collaborate with.</p>	<p>Risk modellers, incl. KatRisk, Oasis LMF, OS-Climate, Aon, GuyCarpenter                      Data Catalyst members, TNFD</p>

### b. Development of standards for vulnerability modelling

Actions, Findings and Explanation	Engaged key stakeholders
<p>3. <b>Agree on common risk metrics.</b> There are different ways to integrate nature into climate risk assessments. To facilitate widespread uptake, risk modellers need to agree on key risk metrics and communicate them effectively. Examples include Tail Value-at-Risk (TVaR), Average Annual Loss (AAL), coherent risk measures, return periods, exceedance probability (Occurrence Exceedance Probability (OEP), Aggregate Exceedance Probability (AEP)), uncertainty.</p>	<p>Climate risk modellers, including KatRisk, OasisLMF, AON, GuyCarpenter, Lloyd's; NGFS, IMF, FSB Climate Vulnerabilities and Data (CVD) workstream</p>
<p>4. <b>Start with shortcuts to expand uptake of proven use cases and progressively introduce better data.</b> Introducing new types of data requires the development of new risk models. However, datasets encompassing the right information can already be used to inform climate risk decision making using shortcuts. Although particularly catastrophe risk modelling firms often have long development cycles, the availability of relevant data allows stakeholders to act and innovate even if a perfect solution is yet to be developed.</p>	<p>KatRisk</p>

**c. Definition of material data points for model input**

Findings, Actions and Explanation	Engaged key stakeholders
<p>5. <b>Template exchange processes exist to identify decision-useful data for climate risk assessments.</b> TNFD’s work on nature-related metrics provides a capable blueprint to assess and incorporate diverse needs into single metrics. This model could be easily adapted, where there was a high-level call, to bring stakeholders together.</p>	<p>TNFD, Data Catalyst by TNFD</p>
<p>6. <b>Compatibility with corporate sustainability reporting can enhance global coverage and data quality.</b> Corporate sustainability reporting will increase the future availability of data. To enhance the decision-usefulness of nature disclosures, dedicated actors can assess nature-related disclosure metrics, analyse their ability to inform climate risk assessments and supply chain exposure data and produce guidance for their further development.</p>	<p>TNFD, EFRAG, ISSB, GRI</p>
<p>7. <b>Develop data standards.</b> The development of data standards for globally coherent decision-useful data on natural capital is key to drive their uptake, including for climate risk assessment models. A standard set of input parameters can facilitate innovation in solution development and incentivise competition within and across markets.</p>	<p>Risk model developers, incl. KatRisk, Aon, GuyCarpenter, Oasis LMF; IMF, NGFS</p>
<p>8. <b>Ensure broad compatibility of standards.</b> Data standards for use by climate risk modellers or for other purposes could be designed to fit the needs of different stakeholder groups. Data standards for use in catastrophe models may require more details and information than for other use cases. Multi-use standards can be designed interoperable. Collaboration between catastrophe modellers and sustainable finance risk modellers could lead to interoperable standards that allow their uptake in more complex catastrophe modelling as well as sustainable finance-related risk assessments.</p>	<p>Insurance risk modellers, incl. KatRisk, Oasis LMF, Aon, GuyCarpenter                      Sustainable finance risk modellers, incl. OS-Climate                      Central banks and regulators, incl. ECB, IMF, FSB, NGFS</p>
<p>9. <b>Encourage use of common data formats.</b> Data should be easy to use and so be delivered in common formats (for catastrophe models e.g. in Grib, netCDF, shp, raster, binary, csv, etc.).</p>	<p>KatRisk</p>

## 2. Provision of material data

### d. Digital access to location-specific asset data

Findings, Actions and Explanation	Engaged key stakeholders
<p>10. <b>Stimulate and facilitate the provision of geolocated asset information.</b> To allow effective climate risk assessments, data on geospatial relationships needs to be available. This includes the location, ownership and key operational characteristics of economic assets. Key research on the application of geospatial data for sustainable finance has been provided by <a href="#">WWF, World Bank and Global Canopy</a>. Data and application examples are available from the <a href="#">Spatial Finance Initiative</a> at University of Oxford.</p>	<p>Spatial Finance Initiative, University of Oxford, WWF-Sight, NGFS Nature Task Force</p>
<p>11. <b>Users will need searchable access to this geolocated asset information.</b> Currently available geo-spatial asset data is limited and available through several data providers or access points. Data users need to spend considerable resources to understand which data provider fits best to their needs. To enhance the overview on data availability of multiple sources, existing data needs to be searchable and digitally available across multiple data providers. Standards for interoperability are needed.</p>	<p>Central banks (Bundesbank Sustainable Finance Data Hub, ECB, NGFS Climate Data Directory)</p> <p>The OS-Climate Data Commons programme (and their associated financial institution members)</p> <p>NZDPU</p>

### e. Access to data on supply chain relationships

Findings, Actions and Explanation	Engaged key stakeholders
<p>12. <b>Scale-up data availability on supply chains and exposure to asset risk.</b> Corporates, financial institutions and insurers need to understand their own, suppliers' or clients' exposures to climate- and nature-related risks in the supply chain or chain of subsidiaries. Essential to link geolocated asset risk to investments or operations, this is proven to be technologically feasible. Leading solutions can be scaled up, where future demand for this data is signalled or mandated.</p>	<p>Open Supply Hub, CDP, Source Map</p> <p>IMF, OECD, WB, BIS, in G20 SFWG alignment transition finance framework project</p>

### f. Ensuring data quality (incentives for data generation, curation, verification, updating)

Findings, Actions and Explanation	Engaged key stakeholders
<p>13. <b>Design digital systems to enhance data access.</b> Sustainability and commercial data can be commercially-sensitive and needs to be accessed securely and confidentially. Risk assessments require timely, qualitative, coherent and searchable data that is easily accessible. Existing technology and governance solutions now offer the potential for confidential</p>	<p>SINE Foundation, Icebreaker One, Open Banking.</p>

access that protects commercially-sensitive data, with appropriate governance and technologies, removing significant disincentives for data access.	
14. <b>Incentivise the creation of high-quality data.</b> High-quality data is costly and will only be provided at scale with adequate rewards. Appropriate design of incentive models can use the significant value of improved data to enhance data access and quality, e.g. through the creation of a fair market for primary and verified data.	Life Itself Labs

**3. Capacity building of decision makers and scaling**

**g. Support leading actors in risk modelling and data provision**

Findings, Actions and Explanation	Engaged key stakeholders
15. <b>Communities exist who can lead development.</b> Some sectors in the financial or real economy, such as re/insurance, are better positioned than others to lead progress in this area, thanks to their existing expertise, interest and resources. Pioneering work with these communities can pilot tools and solutions that then become available to mainstream financial actors.	Insurance and Re-insurance

**h. Facilitate peer exchange**

Findings, Actions and Explanation	Engaged key stakeholders
16. <b>Increase awareness on benefits of enhanced vulnerability modelling.</b> Stakeholder discussions showed that even among leading stakeholders, the financial benefits of improved climate risk modelling were sometimes novel, but immediately interesting. Generating demand for improved vulnerability assessments in climate risk models requires greater highlighting of the benefits of action.	

Bold colours: Steps to be taken by stakeholders		1. Climate risk modelling			2. Data provision			3. Capacity building	
		a. Signal demand for vulnerability modelling	b. Model standard development	c. Define data inputs	d. Access to location-specific data	e. Supply/ investment chain data	f. Ensuring data quality	g. Support the leaders	h. Facilitate peer exchange
Climate risk modellers	Financial institutions								
	Insurers								
	Central banks								
	Modellers & standard curators								
Cooperating data providers	Data providers								
	Geo-located asset data org's								
	Supply chain data org's								
	Data quality and incentive org's								

**Table 1: Overview on required stakeholder action:** To enhance climate risk assessments and enhance financing to biodiversity and adaptation, stakeholders from the climate risk modelling community and data provision need to take the steps indicated in bold in parallel.

### 3 Summary of the stakeholder engagement process

Under the Italian G20 Presidency in 2021, the reinstated **G20 Sustainable Finance Working Group** (SFWG) agreed on the [G20 Sustainable Finance Roadmap](#). It coordinates international Sustainable Finance-related work on 19 Actions in five Focus Areas.

To support and accelerate the implementation of Roadmap Actions related to climate risk assessments and nature-related data, the **EU G7/G20 Environmental Diplomacy Support Project**, with support of the **Nature-related Data Catalyst**, launched by the Taskforce on Nature-related Financial Disclosures (TNFD), hosted a series of workshops over six months from September 2022 until February 2023.

Overall, **130 workshop participants discussed over a series of six workshops with 23 speakers** from several **leading institutions** in central banking, insurance, financial institutions and data providers.

#### 1. Kick-off workshop: Taking forward the G20 Sustainable Finance Roadmap: Improving the value and accessibility of nature-related data for sustainable finance

**September 27<sup>th</sup>, 2022, 49 participants. Workshop report available [here](#).** With introductions by **Dr Ma Jun**, co-chair, G20 Sustainable Finance Working Group and **David Craig**, co-chair, TNFD. Impulse presentations by **Thomas Viegas**, Manager, Market Intelligence and Analysis, Bank of England, **Matt Sandoe**, Climate Risk Lead, BNP Paribas, OS-Climate, **Johan Lammerant**, EU B@B/Arcadis, **Christophe Christiaen**, Spatial Finance Initiative, **David Carlin**, TCFD and Climate Risk Program Lead, UNEP-FI, **Andrej Ceglar**, Climate Scientist, ECB Climate Change Centre, **Jose Galindo**, CEO and Co-founder, Waterplan, **James d'Ath**, Data and Analytics Technical lead, TNFD, **Gavin Starks**, Founder, Icebreaker One, **Anna Stanley**, Partnership for Carbon Transparency (PACT), Director Climate Action, WBCSD, **Truman Semans**, Founder and CEO, OS-Climate.

The high-level kick-off workshop to the series on “Taking forward the G20 Sustainable Finance Roadmap: Improving climate risk assessments with nature data” took place in end-September 2022. The goal of the workshop was to initiate a **process to explore which nature-related data could in future be used to inform climate risk assessments**. With greetings by **Dr Jun Ma**, co-chair of the G20 SFWG and **David Craig**, co-chair of the TNFD, the session brought together experts from central banks, financial institutions and further institutions working on climate risk and nature-related data. Its outcome was a **call to explore use cases** on the link between climate risk assessments and nature-related data.

#### 2. Exploring use cases: Improving climate risk assessments with nature data

In December 2022, two workshops took place that explored the use cases of using nature-related data for two different climate-related risks: **flood risks and freshwater scarcity risks**.

**2.1 Workshop on coastal flood risks, December 8<sup>th</sup>, 2022, 22 participants.** Co-chaired by **Andrej Ceglar**, Climate Scientist, ECB and **Matt Sandoe**, Climate Risk Lead, BNP Paribas and OS-Climate. Impulse presentation by **Guillermo Franco**, Managing Director & Global Head of Cat Risk Research, GuyCarpenter.

With contributions by the European Central Bank, OS-Climate, GuyCarpenter and Oasis LMF, WWF and others, the flood risk workshop focussed on exploring the possibilities to include data on coastal wetlands for coastal flood risk models. It showcased that **coastal wetlands can decrease coastal property damages by around 20%**, according to first studies. It concluded that the scale of the effect is big enough to allow for the development of climate flood risk insurance products that consider nature data on wetlands.



**2.2 Workshop on freshwater scarcity risks, December 14<sup>th</sup>, 2022, 20 participants.** Co-chaired by **Jose Galindo**, CEO, Waterplan. Impulse presentation by **Matteo Oriani**, Climate Change Risk Manager, HSBC and inputs by **Cate Lamb**, Global Director Water Security, CDP.

With contributions by Waterplan, HSBC, CDP Water, WWF and others, the freshwater scarcity risk workshop explored the risks of water curtailment for companies and its materiality for financial institutions. It showed how **data and investments into catchment areas could mitigate risks** and that companies and financial institutions lack data and knowledge to monitor risks for their operations and supply chains. Further, it indicated that given the complexity of freshwater scarcity risks, more **collaboration on data sharing is required** to adequately assess the sustainability of water withdrawals. Required data points include surface bodies' and groundwater aquifers' capacities, entities' water withdrawal and consumption, water replenishment ratios, target setting and others.

### **3. Meeting data needs: Improving climate risk assessments with nature data, regarding coastal flood and freshwater scarcity risks**

**January 10<sup>th</sup>, 2023, 67 participants.** Co-chaired by **Laura Clavey**, Metrics and Targets Lead and **James d'Ath**, Data and Analytics Technical Lead, TNFD. Impulse presentations by **Mike Beck**, Director, UCSC Center for Coastal Climate Resilience, **Dag Lohmann**, CEO, KatRisk, **Manveer Gill**, Senior Manager Sustainable Finance, CDP and **Paul Della-Marta**, Head of Catastrophe Research, Partner Reinsurance Company. Participation of members to the **Nature-related Data Catalyst**, lauched by the TNFD.

On January 10<sup>th</sup>, a workshop co-hosted with the **Data Catalyst**, launched by the TNFD, **explored which steps nature-focussed data providers could take to supply nature-related data relevant for future climate risk assessments, with a focus on the use cases above.** It brought together experts on flood risk modelling and freshwater scarcity risks with organisations who generate and curate nature-related data, yet for other use cases than climate risk assessments. It presented how leading organisations, such as the UCSC Center for Coastal Climate Resilience, provide data that can already be used for climate-related coastal flood risk assessments, by leading risk model firms such as KatRisk. On freshwater risks, CDP, hosting one of the largest data sets on water-related corporate reporting, explored current and future availability of relevant water data. In discussion with workshop participants, relevant data points for future assessments on freshwater risks were explored. Due to the strong participation of data providers convened by the Data Catalyst, the workshop raised awareness on the use case of climate risk assessments for nature-related data.

### **4. Discussing draft recommendations: Taking forward the G20 Sustainable Finance Roadmap**

**February 7<sup>th</sup>, 14 participants.**

The results of the workshop on January 10<sup>th</sup> informed a **draft set of recommendations** that was circulated to all workshop participants. For the drafting of a **final set of recommendations**, interested participants joined a collaborative drafting session to feedback and comment the work progress.

### **5. Insurance follow-up: Introducing natural capital into catastrophe risk modelling**

**February 15<sup>th</sup>, 13 participants.** Co-chaired by **Dickie Whitaker**, CEO, Oasis LMF. Impulse presentations by **Mike Beck**, UCSC, **Dag Lohmann**, KatRisk, **Maryam Golnaraghi**, Director, Climate Change and Environment, The Geneva Association, **Guillermo Franco**, Guy Carpenter.

Given the insurance sector's leading role in the risk industry, this session, co-hosted by Oasis LMF, explored which step the industry needs to take to integrate nature data in catastrophe models on a large scale. The workshop identified several challenges, including the need for education on the concept, to trigger demand for new models and relevant data. It further identified the need for cooperation and standards, that could be facilitated through open source frameworks such as Oasis LMF or others.

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