Applying a Systems-Based Approach to Move from Climate Risk to Resilience

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Contents

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DISCLAIMER

Meeting the Urgency: Adaptation and Resilience in Focus

As the warmest year on record, 2024 officially marked the first breach of the Paris Agreement, which aims to limit warming to no more than 1.5°C above preindustrial levels. Global temperatures are expected to remain at or surpass 2024 levels, with an 80% chance that at least one year between 2025 and 2029 will become the hottest on record. The world is no longer on course to limit warming to 1.5°C but rather is moving toward a future troubled by increased intensity and frequency of extreme weather events. This extreme weather threatens human well-being, access to resources, and quality of life, underscoring the urgent need to prioritize climate adaptation.

To effectively adapt to the rapidly changing environment, companies need to adopt a systems-based approach that helps to move from climate risk identification to resilience building. Unfortunately, climate adaptation is not occurring at the pace and scale that's needed. Scattered or ad hoc climate efforts are not sufficient. Instead, systems thinking that considers climate, nature, and human rights holistically is essential to address cascading and cumulative risks.

Looking back on the past decade, the corporate climate agenda has prioritized climate mitigation and the reduction of greenhouse gas (GHG) emissions. While decarbonization remains urgent and necessary, there has been limited progress on climate adaptation and resilience. According to S&P Global, only 35% of large companies across sectors disclose plans to adapt to physical climate impacts.

Without putting climate adaptation and resilience measures in place, physical climate impacts could cost large companies $1.2 trillion per year in the 2050s. Based on existing policies and pledges, we are headed toward a calamitous 2.7°C increase in global warming by 2100.

A reflection but also a driver of this lack of corporate progress is the massive financing gap for adaptation and resilience. Even though adaptation financing more than doubled between 2018 and 2022, to US$76 billion, most of the funds came from the public sector, with private

BOX 1

Why does the 1.5°C target matter?

Climate models show warming above 1.5°C could increase the frequency and intensity of extreme heat, droughts, heavy precipitation, and extreme weather events across the globe. It could trigger multiple ecological tipping points, including the collapse of ice sheets, die- off of coral reefs, and abrupt permafrost thaw.

These changes could be irreversible and seriously impact food production, spread diseases, displace people, and disrupt global socioeconomic stability. As compared to 1.5°C of warming, 2°C of warming would double the number of heatwaves in Southern Africa, expose 200 million more people to droughts, and cost an additional $17 billion globally in residual damage and adaptation for major crops.

finance contributing less than 2% of the total. Current annual flows cover only one-third of the funding needed by 2030 in emerging markets and developing economies (EMDEs) alone.

These countries are among the most climate-vulnerable and least prepared to adapt, yet they remain critical to global supply chains, supplying essential raw materials and hosting major manufacturing and production hubs. As such, the private sector urgently needs to scale up investment and adaptation efforts to prevent further business disruptions that will threaten the resilience and continuity of socioeconomic systems.

BOX 2

The economic logic of adaptation

By 2050, 5% to 25% of unprepared businesses' EBITDA will be vulnerable to physical climate risks. Whereas, for every US dollar invested in adaptation this decade, an overall economic benefit of USD$12 could be generated.

However, businesses face several challenges in closing this gap. BSR's findings, based on several years of research and interviewing a number of real-economy companies, financial institutions, and civil society organizations, highlighted several key challenges. These include:

- Misalignment on the definition of adaptation and resilience within the organization, across the supply chain, and between public and private sector actors
- Lack of clarity on expectations and requirements for setting adaptation goals and targets, incorporating a science-based approach into climate plans and disclosure
- Limited visibility of business-relevant guidance on adaptation, specifically on how to move from climate risk identification to adaptation planning and resilience building
- Challenges to develop and implement tailored adaptation plans and solutions for local contexts, including how to maximize co-benefits and minimize trade-offs across climate, nature, and human rights
- Competing priorities, C-suite misalignment, and return on investment pressures that keep adaptation framed narrowly as business continuity, thereby preventing action and overlooking business opportunity

BOX 3

What is adaptation and resilience?

Climate Adaptation is the process of adjusting to the actual or expected climate and its effects to moderate harm or exploit beneficial opportunities (IPCC, 2022).

Climate Resilience is the capacity of social, economic, and environmental systems to cope with climate-related hazardous events, trends, or disturbances, responding or reorganizing in ways that maintain their essential function, identity, and structure (IPCC, 2022).

At BSR, we view adaptation as one of the means to achieve resilience.

Minding the Gap: Corporate Guidance Under Review

In the first half of 2025, BSR reviewed the landscape of adaptation, resilience, and transition planning guidance to understand if published resources were addressing the barriers to corporate adaptation and resilience action that we had identified through our stakeholder interviews.

Where Current Guidance Delivers Value

While business practitioners have stated that a key barrier is the lack of consensus across adaptation and resilience definitions, both within and beyond corporate organizations, our findings suggest current climate adaptation and resilience resources are working to close that gap by providing key terms and definitions, often aligned with the Intergovernmental Panel on Climate Change (IPCC). (See Box 3 for definitions)

Considered a foundational building block for kickstarting an adaptation journey, resources have largely established the methodology for companies to undertake physical risk assessments, including scenario analysis, vulnerability assessments, and quantification approaches. Beyond the assessment process, several resources outline potential next steps for companies to digest their results, often citing scenario planning and flexible adaptation pathways as an interim step for setting goals, developing an adaptation plan, and defining a strong governance structure to oversee and implement the adaptation plan.

Where Existing Guidance Falls Short

- **Guidance matching the prescriptiveness of risk frameworks for assessing opportunities and quantifying their value.** While existing resources amply demonstrate the business case for climate adaptation, few offer practical methods for evaluating the cost of inaction and the ROI of adaptation solutions, which is essential for attaining buy-in from senior leadership and deploying capital.
- **Tailored recommendations to a given industry or geography** to illustrate how broad principles can be applied across different sectors and regions. In our stakeholder interviews, corporates strongly emphasized the need for sector-specific guidance and road maps to inform actionable decision-making at the regional, sector, and activity level.
- **Tactical frameworks for identifying co-benefits and trade-offs across climate, nature, and people to build resilience.** While many climate adaptation resources stress the importance of integrating nature and people considerations to avoid maladaptation, only a few offer guidance on identifying co-benefits and trade-offs between adaptation and mitigation solutions and/or human rights and nature dimensions. Similarly, most transition planning resources encourage a holistic approach that considers synergies and trade-offs, yet none outline clear methodologies to guide practitioners through the process.
- **Clear expectations and recommendations on disclosure requirements for adaptation and resilience,** notably for transition planning resources. Critical areas that require further standardization include the development of

comparable metrics and targets, financial planning methodologies for integrating adaptation measures, and regulatory alignment between adaptation disclosures and emerging requirements. In the absence of these, companies are experiencing difficulties to tangibly integrate adaptation into their existing plans and processes, monitor progress, and disclose their actions. To address these gaps, the Transition Plan Taskforce's (TPT) Adaptation Working Group and the Network for Greening the Financial System (NGFS) have introduced recommendations for the inclusion of adaptation and resilience in transition planning to incentivize widespread and consistent corporate implementation.

BOX 4

What is a 'systems-based approach' to adaptation?

BSR defines a systems-based approach to adaptation as a way of planning, evaluating, and implementing solutions that recognizes the interconnectedness of climate, nature, and human systems, working to identify, mitigate, and remediate negative impacts as well as maximize positive outcomes across those dimensions.

In practice, this means:

- Looking beyond individual sites or assets to consider wider systems (e.g., supply chains, ecosystems, communities)
- Identifying interactions and feedback loops, such as how one solution may create co-benefits or unintended trade-offs elsewhere
- Considering risks and opportunities not only in isolation, but also as compound, cascading, or cumulative across time and space
- Designing and implementing solutions that contribute to long-term resilience while avoiding maladaptation and maximizing co-benefits for climate, nature, and people

In this guidance, this systems-based approach is used as a practical tool for companies to ensure that adaptation decisions are holistic, forward-looking, and aligned with broader resilience goals.

Our Role in Bridging the Guidance Gap

BSR is creating business-relevant materials to support the private sector in scaling climate adaptation and resilience efforts. We have developed this guidance to support risk and sustainability teams within the private sector in overcoming some of the challenges outlined on page 4, by proposing the use of a systems-based approach as they move from risk identification—across climate, nature, and people — to climate adaptation and resilience building.

This guidance encourages companies to expand beyond a climate-centric lens by exploring how nature and human rights dimensions can be integrated into the risk identification, opportunity assessment, and solution evaluation phases. Using a simulation exercise with redacted data from a real-economy company, **BSR presents a six-step framework for transitioning from risk identification to resilience building through a systems-based approach that assesses co-benefits and minimizes unintended trade-offs**.

This guidance is centered on moving from risk identification to evaluating adaptation options, without covering their implementation. As such, it does not seek to duplicate existing adaptation planning resources, which have a wider focus that supports companies in the coordination of efforts across enterprise-level functions, business units, and value chain stakeholders around the development of targets, governance, financing strategies, and monitoring mechanisms. (See the Appendix for a high-level landscape analysis on existing adaptation guidance and frameworks)

Rather, this guidance complements critical adaptation planning guidance by offering an integrated lens across climate, nature, and human rights dimensions to ensure a systems-based approach to resilience.

Overview of Our Approach

The first tactical step to kickstart the adaptation journey begins with the assessment of physical climate risks to the business. This typically entails conducting climate risk assessments, including vulnerability at the asset level and scenario analysis to test business strategy and understand the extent to which a company's exposure and vulnerability to hazards might fluctuate across time horizons and scenarios.

Companies' maturity in conducting these assessments is gradually increasing, as is the pressure for businesses to think holistically across sustainability issues. In this context, BSR's conversations with companies on the intersectionality of sustainability topics reveal:

- Many companies apply a narrow approach to climate risk assessments by either failing to assess vulnerability, which can skew findings, or applying the findings only to climate transition (mitigation) plans rather than both mitigation and adaptation plans.
- Despite mounting pressure, companies are still uncertain of how to integrate physical climate and nature risk and opportunity assessments, and how to interpret and leverage those findings.
- While there is interest in including social considerations or human rights implications, these remain separate and are rarely included at the assessment or planning stages. When factored in, it often occurs at the implementation stage.

These challenges are carried over subsequent stages of the adaptation planning process, affecting the way companies devise actions to build resilience. To bridge those gaps, BSR's guidance proposes a systems-based process to move from risk assessment to resilience building in a way that considers potential impacts on nature and people. To bring our guidance to life, BSR uses an anonymized case study from a real company and augments its climate scenario analysis findings to highlight:

- The process, potential tools, and/or frameworks that could be used at each stage of our proposed approach
- Key steps for digesting and leveraging the findings from the climate, nature, and human rights assessments
- A suggested method for evaluating co-benefits and trade-offs across a company's portfolio of adaptation solutions

Specifically, the approach consists of the steps on the following page:

1 Conduct Climate Risk Assessment

Assess climate risks and opportunities, ensuring that physical risks and opportunities and climate vulnerability are assessed at the asset level

- Climate scenario analysis, GIS mapping, sensitivity and adaptative capacity analysis
- Identified physical and transition risks and opportunities across time horizons and transition scenarios, Mapping of assets with associated exposure and vulnerability to physical climate hazards

2 Conduct Biodiversity Screening and Human Rights Scan

Screen physical, reputational and regulatory biodiversity risks and scan human rights risks across assets

- WWF Biodiversity Risk Filter tool, Country-level Human Rights Context and Risk Indicators
- Biodiversity risk rating and understanding of potential risks to people. List of locations with high nature and human rights risks

3 Prioritize Assets

Evaluate findings across the three dimensions, appreciating limitations. Define strategic significance criteria to prioritize assets under the basis of their combined risk intensity and business criticality

- Asset prioritization exercise based on strategic significance and severity and likelihood of risks
- Identified prioritized assets for development of adaptation solutions

4 Evaluate Opportunity Relevance at Asset-Level

Scan and categorize nature and climate opportunities that could play a factor in selecting the right adaptation solution(s)

- Opportunity scanning across climate and nature. Evaluation of whether opportunities may carry adverse human rights impacts
- Identified opportunities that are relevant to the ideation and selection of adaptation solutions

5 Develop Evaluation Criteria for Solutions

Design key criteria and considerations for weighting potential co-benefits and trade-offs across the three dimensions along with feasibility and strategic fit criteria for each solution

- Development of considerations relating to the business co-benefits and trade-offs across climate, nature, and human rights
- Decision-making framework for the selection of adaptation solutions

6 Identify and Select Solutions

Identify and define solutions and rank them based on their ability to maximize benefits to the company, environment, and communities while avoiding maladaptation

- Ranking exercise for adaptation solutions
- Identified rights-respecting adaptation solutions that benefit the business, climate, and/or nature at the prioritized assets

Required Tools and Processes

Expected Output

Note: We refer to assets as any form of capital, tangible or intangible, that contributes to a company's resilience. This might include physical infrastructure, operations, ecosystems, social or contractual relationships, value chain actors, affected communities, etc.

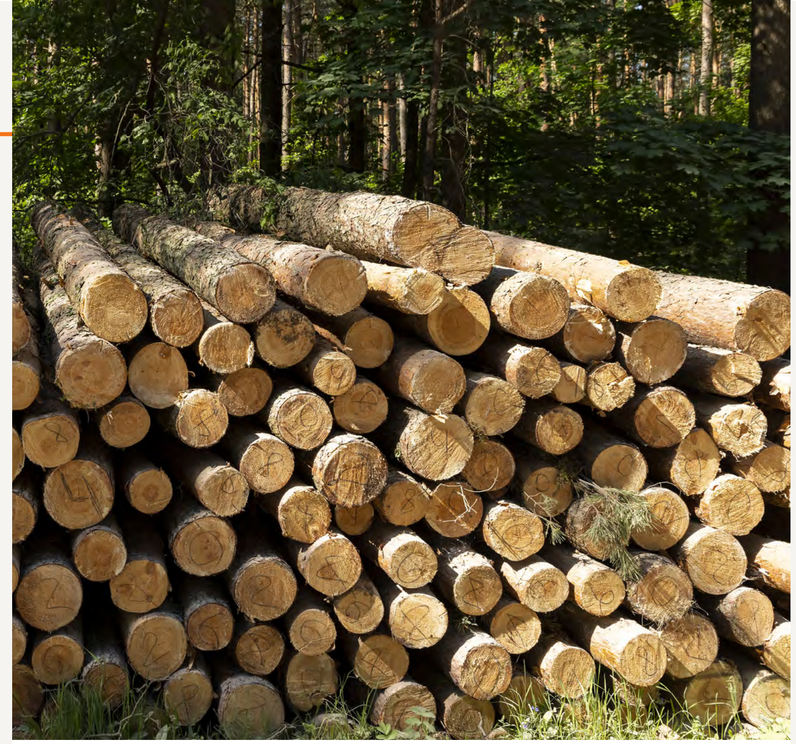
CASE STUDY:

Meet PulpaNova

PulpaNova is a company specializing in timber and related forest products, primarily serving markets across Asia, Europe, and North America. Its directly owned and operated facilities include pulp mills, sawmills, and mass timber plants. Within their own managed tenures as well as upstream, PulpaNova manages forestlands with a clear mandate to procure from sustainably managed forests and its products—used in construction, packaging, tissue, and specialty paper—are distributed globally through a network of logistics partners and export terminals.

PulpaNova recently conducted a climate risk assessment through scenario analysis covering physical and transition risks and opportunities, which led to the identification of strategic solutions for the company to consider. The company understood that to reduce its climate risk, an adaptation plan is needed to complement and build off their existing mitigation strategies, and to help define targeted solutions were needed.

As they dove into the topic, they gained awareness on how systems-based approaches could help them avoid the risk of maladaptation and amplify the triple dividend[1] gains of adaptation solutions. With those considerations in mind, PulpaNova's team defined a methodology that considered human rights and nature impacts alongside climate, anchored in a decision-useful framework that evaluates adaptation solutions and ensures its investments create shared benefits rather than shift or amplify risks.



In the following sections, PulpaNova's six-step framework is featured. The case study presented here simplifies the process to illustrate how the framework can be applied. In practice, companies should expect a more complex, iterative journey that requires deeper analysis, cross-functional engagement, and refinement over time.

1 The term "triple dividend" was introduced by Surminski et al. (2016) and further developed by Heubaum et al. (2022) to refer to the three types of benefits adaptation actions can yield, notably on avoided losses and damages, economic and development benefits, and socio-environmental (non-market benefit) effects.

PulpaNova's Approach: A Step-by-Step Overview

1 Conduct a Climate Risk Assessment

Reflecting on its recently completed climate risk assessment, PulpaNova evaluated its findings to determine if the company had sufficient insight into its exposure and vulnerability to physical hazards. It concludes that an additional vulnerability assessment is needed, which it performs, as well as a deep-dive on its climate opportunities at the asset-level, which it runs on Step 4.[2]

Assessment Type	Approach	Findings	Required Next Step
Climate risk	A scenario analysis was run across three scenarios from 2020s–2050, including physical and transition risks and opportunities. An additional physical risk assessment was run through GIS mapping across all its direct operations and T1 suppliers (15 assets total) for five key hazards.	The likelihood and severity of assets' exposure to five hazards were estimated. A convening of internal stakeholders helped estimate the potential financial impacts to the company in absence of mitigating management as well as the perceived effectiveness of existing controls to reduce risk.	Because PulpaNova's vulnerability to those climate hazards was not evaluated at the asset level, the team uses CLIMADA[3] , an open-source computer framework, to model how its assets could be damaged by climate risks and understand its adaptative capacity to the five climate hazards.
Opportunity	In line with TCFD, the scenario analysis also included physical and transition opportunities across the three scenarios.	The convening helped estimate the effectiveness of existing opportunities and their level of completion across key geographies and business lines.	While adaptation-related opportunities were identified, the team decides to conduct additional research at the asset level to render insights actionable. See Step 4 for more information.

2 Opportunities refer to activities that result in positive outcomes for organizations and the environment by creating positive impacts or mitigating negative impacts on climate and nature. These activities can include efforts to mitigate and adapt to climate change, manage nature-related risks, and reverse the loss of nature. Positive outcomes can include reputational capital gain, market expansion, and increase in resilience. (Adapted from TCFD, 2021; TNFD 2023).

3 BSR recently released a white paper on 'Quantifying Climate Risk and Its Impact on Business Performance' where they use CLIMADA and other models to quantify physical climate impacts.

2 Conduct a Biodiversity Screening and a Human Rights Scan

Seeking to apply a systems-based approach, the PulpaNova team broadens their climate risk assessment with a biodiversity screening and a human rights scan to identify how other factors may exacerbate or reduce their climate risk. To streamline the process, the team runs these screenings for the assets that were identified, during the previous step, as under high exposure to physical climate risks.

OBJECTIVE

Perform a biodiversity screening and human rights scan to…

Identify additional patterns across assets

Identify additional issues per asset

So that the we can answer the question…

Are there any previously identified or new strategic priorities that could drive a corporate / regional effort on adaptation?

Are there any specific assets the company could prioritize to altogether address climate and nature risks and opportunities while avoiding and preventing adverse impacts on people?

To meet the need for…

Building the case for responding to a group-wide risk affecting its business resilience

In mind of limited resources, directing investment to priority assets with highest positive impact potential and minimal negative impact

Biodiversity Risk Screening

Approach

- Using the WWF Biodiversity Risk Filter tool, the team runs a biodiversity risk screening for the assets under high exposure to physical climate risks (11 out of 15 assets).
- This required a clear understanding of assets' location (specifically, their GPS coordinates), associated economic activities (ISIC,[4] GISC,[5] NACE,[6] codes, etc.), and business importance, which the team already had from the climate assessment.
- Each asset was assigned a biodiversity risk rating, from very low to very high where if both the Scape[7] Physical Risk Score and Scape Reputational Risk Score exceeded 3.4 out of 5, they were within the threshold of high or very high risk.

Findings

- All assets had a high or very high physical biodiversity risk score, yet only two—both supplier assets—of the 11 assets screened were identified to have an overall high biodiversity risk (reputational and physical risk).
- This screening helped the team contextualize the magnitude of their assets' impact on nature by understanding the associated impacts and dependencies of the economic activities occurring at the selected assets while considering the state of nature and biodiversity in those locations.

Required Next Steps

The team is aware of the potential overlaps and interconnections between their climate and biodiversity assessments. They also note that, unlike the climate risk assessment, the biodiversity risk screening presents a static picture and does not reflect potential changes across different future scenarios.

While down the line PulpaNova could resolve some of this by conducting a nature scenario analysis and refining their screening through the Taskforce for Nature-Related Financial Disclosure's LEAP approach, for the time being, they resolved to integrate their different datasets in Step 3, keeping those limitations in mind.

4 ISIC (International Standard Industrial Classification of All Economic Activities) is an international classification system of economic activities by the United Nations.
5 GISC (Global Industry Classification Standard) is an industry classification standard developed by MSCI and S&P Dow Jones Indices to support investors in understanding key business activities.
6 NACE (Nomenclature des Activités Céconomiques) is the classification system of economic activities in the European Union.
7 Scape is used to refer collectively to landscapes, seascapes, and river basins (freshwater systems) surrounding a company's operational and supply chain site.

Human Rights Screening

Approach

- The team conducts a country-level human rights risk scan to understand the regional and country- level human rights context.
- The team relies on publicly available, globally comparable data across human rights themes, including labor rights, governance, and social protections, to compile 21 risk indicators across key human rights areas (refer to the Appendix).
- The key objective of this exercise was to learn from and **understand the risk context**, notably in relation to the presence of Indigenous People and respect for Indigenous rights; land rights and land ownership customs including informal/customary land tenure systems; human rights defenders context; understanding of vulnerable groups, social norms, and discrimination, role of women/gender norms, attitudes/treatment of migrants, refugees, or minorities; ratification of international treaties and enforcement of laws.

Findings

- The team gained a better understanding of the human rights risk context within the geographies of PulpaNova's assets.
- They also identified risk "hotspots" where multiple dimensions of human rights risk categories (e.g., working conditions, weak governance) overlapped, potentially signaling higher structural vulnerability for the team to examine.
- Working conditions and forced labor surfaced as common overarching risk categories for PulpaNova to monitor across the globe.

Required Next Steps

The scan provided detailed results at a country level, whereas both the climate and biodiversity screenings used assets specific to geolocation. As such, PulpaNova's team notes a **complementary qualitative analysis will be required** once assets are prioritized for an adaptation solution to evaluate how the forward-looking identified climate trends might erode human rights in the future and which asset-level stakeholders would be most impacted, and ensure that any solution takes account of these considerations.

With both screenings completed, the team sets out to **organize its findings across climate, biodiversity, and human rights** to re-interpret and prioritize those assets for which a solution in the immediate term would be warranted.

3 Prioritize Assets

Having completed all risk assessments and noting the difference in the spatial scales of the climate and biodiversity assessments when compared to the human rights scan, the team contrasts their findings, following the considerations outlined on the right in this page. This enables them to put together an impact-driven prioritization ranking, with assets ranked first when climate and nature risks are highest and human rights risks are lowest. This is because, for prioritizing action on adaptation, the team seeks to prioritize those locations where they are least likely to impact human rights either by avoiding or mitigating the risks to people, and as a last resort, remedy any negative impacts that happen despite prevention efforts.

The team also considers the strategic significance of each asset, following the guiding criteria outlined on the right in this page.

Contrasting both lists, the team reevaluates their asset ranking and isolates two assets for immediate prioritization with the highest strategic significance for PulpaNova and where risks are most severe across climate and biodiversity and impacts to people would be minimal (see Figure 1 for an overview of this analysis for owned and directly-operated assets):

- GenOne, a pulp mill located near a river and surrounded by boreal forests
- GenThree, a sawmill located near a floodplain and river

Step 3: Guiding Considerations to Prioritize Assets

Before Crafting the Impact-Driven Prioritization Ranking

- **Compare climate and biodiversity methodologies, assumptions, and data inputs/outputs across assessments**
  How were the likelihood, scale, and severity of risks calculated? Is there an overlap of variables and metrics across assessments? Are spatial scales comparable? Is harmonization and normalization possible?
- **Clarify future risk projections**
  How do those risks change over time? Do the climate projections shed light as to whether the nature or people risks might be reduced or intensified over time?
- **Evaluate how risks interact with one another**
  Do the insights from one screening offer an additional lens to contextualize the risk severity or exposure of another? Are multiple

risks occurring together? Do they suggest cascading or cumulative risks might be triggered? Are they specific to the asset or do their combined effect expand beyond other "scapes" and communities?

Layering Assets' Strategic Significance

- **Business criticality:** How critical is the asset* to PulpaNova's business (i.e., in terms of volume production, turnover, dependency to sensitive/critical materials or locations, future growth potential, etc.)?
- **Future role of the asset:** What is the asset's lifespan? What are the business plans for that asset (i.e., recent/future investment vs. early replacement, expanded vs. reduced capacity, new R&D potential, long-term relationship with supplier's asset vs. potential change/ divestment from supplier, etc.)?
- **Influence and control:** Is the asset under the direct control of PulpaNova?

FIGURE 1: Asset Prioritization Matrix Considering Risks and Business Significance

		Impact Prioritization Scoring			Business Significance			Ranking	
Country	**Asset Name**	**Climate**	**Nature**	**Human Rights**	**Business Criticality**	**Asset Lifespan**	**Control vs. Influence**	**Score**	**Ranking**
Canada	**GenOne**	**Very High**	**Medium Risk**	**Low Risk**	**3**	**2**	**3**	**3**	**1**
	GenTwo	High	Medium Risk	Low Risk	3	2	3	2.6	2
Germany	**GenThree**	**Very High**	**Medium Risk**	**Low Risk**	**2**	**3**	**3**	**2.6**	**2**
	GenFour	High	Medium Risk	Low Risk	1	2	3	2	5
	GenFive	High	Medium Risk	Low Risk	2	2	3	2.3	4

The Impact Scoring has been normalized across assets, from low to very high risk. The Human Rights score is still at the country level, and will require more granular analysis once assets are prioritized. High scores will be prioritized for Climate and Nature considerations, whereas low scores will be prioritized for Human Rights in order to minimize potential human rights impacts when implementing adaptation solutions.

The Business Significance criteria is scored on a scale of 1-3 where 1 indicates lowest significance, projected lifespan or sphere of control and influence and 3 the highest. Even though GenTwo shares the same ranking position as GenThree from a business-lens, GenThree is prioritized given its higher impact scoring.

*Even though GenTwo shares the same ranking position as GenThree from a business-lens, GenThree is prioritized given its higher impact scoring.

4 Evaluate Opportunity Relevance at Asset Level

Having prioritized GenOne and GenThree for immediate solution, the team scans for relevant climate and nature opportunities (e.g., market growth, regulatory incentives, reputational gain, etc.) that could be leveraged as they consider potential adaptation solutions[8] that mitigate the identified risks and realize critical opportunities across climate and nature.

They first review the group-level climate opportunities identified during their scenario exercise to locate opportunities that could be applicable at the asset level (see Guiding Considerations to Evaluate Relevant Opportunities at Asset Level on the right side of this page).

They then explore nature opportunities, and use the Taskforce for Nature-Related Financial Disclosure (TNFD) to categorize the identified nature opportunities, which are similar to the TCFD's but with specific considerations for the sustainable use of natural resources and ecosystem protection, restoration and regeneration.

In their analysis, they record any climate and nature opportunities that would compel the company to pursue actions carrying significant trade-offs for other conflicting climate and nature objectives and where the realization of those opportunities could result in unintended harm to people.

The team then shortlists climate and nature opportunities for their two prioritized assets and use these to start putting together their portfolio of adaptation solutions (Figure 2 shows an example for GenOne).

Guiding Considerations to Evaluate Relevant Climate and/or Nature Opportunities at Asset Level

Context setting: What is the asset's local context (i.e., types of natural ecosystems and communities)? What operational activities and sustainability measures are planned or in place?

Relevance to adaptation: How effective would the climate and/or nature opportunity be in responding to the local context and in mitigating the company's exposure to climate and nature risks?

Potential trade-offs to climate, nature, or people: Would pursuing that climate and/or nature opportunity likely result in an unintended negative consequence(s) on climate, nature, or communities now or in the future? Can these unintended negative consequences be avoided, mitigated, or remedied with well-designed measures?

8 Adaptation solutions refer to actions, technologies, or policies that help communities, ecosystems, or economies prepare for, prevent, respond to, or recover from climate shocks and stresses. These can include infrastructure changes, policy reforms, or nature-based approaches (WBCSD, 2025 and GARI, 2024).

FIGURE 2: Final List of Relevant Climate, Nature, and Human Rights Risks and Opportunities for GenOne Asset

Asset Information

GenOne is a pulp mill central to PulpaNova's operations and pulp production capacity. It has a full utilization of all biomass materials; with its own biomass energy generation.

To maintain ecological integrity of its sourcing areas, their forest management plans undergo consultations with Indigenous communities, government, commercial, and public stakeholders.

Geographical Context

Situated in proximity to a main river and surrounding boreal forest and agricultural land. This could expose the asset to floods, but the area is suffering from lower precipitation and river flow discharges. While the local water supply is currently not at risk, the asset's operations use significant water resources (30–60 m^3 of water per ton of pulp produced) and while 90% is returned to its source, the river supports local biodiversity, local communities and indigenous peoples, agriculture and a hydropower downstream.

Climate — ●●● HIGH RISK

Highest risk associated with water given wildfires, river discharge decrease and precipitation decrease appear in both Delayed Transition and Net Zero scenarios

OPPORTUNITY

Resilience: Expand existing initiatives to increase resilience against climate impacts e.g. planting resilient wood species, using salvage wood or seeking supply in lower-risk areas

Products and Services: Offer new pulp solutions for carbon storage that can be used as CO_2 certificates

Energy Source: Develop a CCUS project targeting biogenic CO_2 emissions to improve net abatement of emissions.

Markets: Invest in growing domestic markets to avoid significant transportation costs

Nature — ●●○ MED RISK

- **Dependencies:** Very low forest productivity and accessibility to timber associated with high herbicide resistance, low pollination and ecosystem intactness and poor soil conditions
- **Impacts:** Asset activities contribute to forest canopy loss, invasive species and land and freshwater use change. It overlaps with protected/ conserved areas

OPPORTUNITY

Resource Efficiency:

- Adopt technologies that increase efficiency and circularity of the pulp production process
- Consider water stewardship actions to manage and protect water availability in the region

Ecosystem protection, restoration and regeneration
Through forest management plans, deploy soil and water conservation, and watershed protection to increase the ecosystem's capacity to buffer against hazards

Human Rights — ●○○ LOW RISK

Potential risks derive from working conditions associated with contracted and seasonal labor, environmental harm from pollution incidents and risk of violating Indigenous land rights as there is an incomplete recognition of their land rights in the region

OPPORTUNITY

Not Applicable

Please note: For this and the previous steps, the team validates their findings through organized workshops and focus groups with key stakeholders, (i.e. relevant team functions, business unit representatives, and local stakeholders). For climate and nature information, they conduct an on-site investigation to translate potential into actual risks and opportunities. For human rights, they consult local stakeholders to assess whether any of the climate and nature opportunities might result in unintended adverse human rights impacts. They consult relevant resources (recorded in the Table of Resources in the Appendix) to ensure alignment with best practices.

5 Develop Evaluation Criteria for Solutions

Prior to identifying and defining adaptation solutions for its selected assets, the team draws on available adaptation and resilience resources (see Table of Resources in the Appendix) to design a decision-useful process with the aim of equipping senior leadership with the information needed to make informed choices on where to invest, based on each solution's:

- ✔ Effectiveness in addressing risks and capturing opportunities in the local context
- ✔ Strategic fit, including financial and business implication
- ✔ Impact on stakeholders and the environment, accounting for trade-offs and co-benefits
- ✔ Feasibility of implementation

The framework serves as an evaluation checklist helping to probe future adaptation solutions to ensure they support a systems-based approach.

FIGURE 3: Evaluation Checklist for Adaptation Solutions

Criteria

Screen for Strategic & Adaptation Fit

- ☐ **Strategic Fit:** Alignment with corporate and sustainability strategies, roadmaps and budgets
- ☐ **Adaptation & Resilience Fit:** Effectiveness in addressing physical hazards and building long-term socio-ecological resilience
- ☐ **Opportunity Capture:** Potential to realize identified opportunities and create business value
- ☐ **Impact Boundary:** Implementation scope (i.e. within corporate boundaries vs broader systems and communities)

Apply Co-Benefits & Trade-Offs Lens Across Climate Mitigation, Nature & People

- ☐ **Co-Benefits & Trade-Offs Identification:** Likelihood and degree to which the solution indirectly or directly
  - Reinforces or undermines the company's decarbonization pathway
  - Reinforces or undermines efforts to address nature risks and support biodiversity and ecosystem services
  - Causes or contributes to negative human rights impacts (e.g. violation of rights to water access, land use, livelihoods, and cultural heritage)
- ☐ **Sensitivity to Interactive Effects:** Likelihood and degree to which compound, cascading, or cumulative effects may amplify or offset these outcomes
  - Compound Effects: Potential for interaction with other actions to amplify or undermine resilience (e.g. ecological or community resilience to climate change)
  - Cascading Effects: Potential to trigger follow-on impacts in other systems (i.e. affect downstream communities, supply chain resilience, or unlock innovation elsewhere)
  - Cumulative Effects: Potential for exponential benefits or long-term system change through the scale-up or repetition of the solution over time

Assess Technical & Operational Feasibility

- ☐ **Technology Readiness:** Maturity, availability, and required expertise to run solution
- ☐ **Scalability & Flexibility:** Long-term impact potential and adaptability of solution to changing conditions
- ☐ **Regulatory & Legal Feasibility:** Need for approvals or compliance considerations in the local context
- ☐ **Collaboration & Ownership:** Reliance on external actors (e.g. peers, NGOs, local government and communities) and responsibility and role allocation regarding ownership, design, implementation, and monitoring of the solution

6 Identify and Select Solutions

With the relevant climate, nature, and human rights risk and opportunity information for its GenOne and GenThree assets, the team engages internal functions and business units and local stakeholders to identify and assess the most relevant adaptation solutions for those assets.

Given that the earlier assessments relied primarily on quantitative metrics, incorporating stakeholder input and local contextual nuance from both internal and external stakeholders would help uncover issues that the data alone might overlook, especially the interactive effects across the different risks. The inclusion of Indigenous peoples as well as local communities further helps PulpaNova define which solutions address the hazards that are most important for the community and for the ecosystem services they rely on to adapt to climate change. Aside from the evaluation of the solutions, the team notes that stakeholder engagement will need to be continued during the co-creation phase of the adaptation solution they end up selecting, as well as throughout its implementation (see Table of Resources in the Appendix).

Once solutions are defined, the team assesses them against their evaluation checklist. To do so, they draw on desktop research, input from local business units, consultation with local and Indigenous communities, and on-site evaluations by technical experts.

This approach supports PulpaNova's understanding of each solution's impact, including co-benefits and trade-offs, across climate, nature, and human rights. It also ensures the consideration of both immediate and long-term impacts while incorporating internal perspectives on feasibility and effectiveness (Figure 4 shows how the team assessed one of the proposed solutions for GenOne).

PulpaNova's solutions for GenOne

a) Conduct pilot studies to plant suitable native and fire-resilient trees

b) Explore internal water loop reuse to reduce freshwater demand, and use treated water for wetland restoration

c) Upskill local and Indigenous communities with sensor and monitoring technology to assess ecosystem services' health

FIGURE 4: Assessment of the Internal Water Loop Reuse Solution Using the Evaluation Criteria

The solution to explore internal water loop reuse to reduce freshwater demand, and use treated water for wetland restoration

Criteria: Strategic & Adaptation Fit

SUB-CRITERIA	ASSESSMENT
Strategic Fit	• Aligns with PulpaNova's mandate to procure from sustainably managed forests. • Requires upfront investment to deploy the water loop reuse technology and to conduct an ecological study to evaluate the hydrology of the wetland.
Adaptation & Resilience Fit	Addresses future water competition concerns, lowers water footprint in favor of other water uses for communities and species, and increases forest resilience to droughts and wildfires with the wetland acting as a natural firebreak.
Opportunity Capture	Helps to increase pulp mill's climate resilience and resource efficiency.
Impact Boundry	Applies beyond GenOne's boundaries and contributes towards the restoration of wetlands, thereby contributing to ecological and community resilience.

Criteria: Technical & Operational Feasibility

SUB-CRITERIA	ASSESSMENT
Technology Readiness	Technologies are well-established and well within the range of PulpaNova's expertise and current use of water treatment technologies.
Scalability & Flexibility	Possible to scale up solution in other assets but will require long-term and adaptive management to restore each wetland.
Regulatory & Legal Feasibility	While PulpaNova holds rights to manage the wetland zones, they need to engage in dialogue with the government and communities along the entire process.
Collaboration & Ownership	Requires collaboration with stakeholders (e.g. academia, civil society organizations, and communities) to acquire knowledge regarding the ecology and hydrology of the wetland prior to the solution's design and implementation.

Criteria: Co-Benefits & Trade-Offs with Climate Mitigation, Nature & People

SUB-CRITERIA	ASSESSMENT
Climate Mitigation	• The water loop reuse can moderately reduce GenOne's Scope 1 &2 and the wetland's restoration can enhance overall carbon sequestration. • If solution is designed modularly and powered by renewables, it is unlikely to generate lock-in of future emissions.
Nature	• The solution can reduce reliance on freshwater withdrawals from groundwater and rivers. • It could also contaminate water sources if the water is not treated properly or disrupt the wetland if discharge flows don't match it's hydrological needs.
People	• The solution would reduce PulpaNova's net withdrawals, thereby preserving local and Indigenous communities' continued access to water. • Unlikely to result in significant conflicts with communities as PulpaNova is mandated to manage wetland zones in consultation with them.

SUB-CRITERIA	ASSESSMENT
Compound Effects	Wetland restoration could simultaneously recharge groundwater, sequester carbon, and enhance biodiversity while reducing mill freshwater demand.
Cascading Effects	Improved wetland hydrology could cascade into healthier ecosystems, more reliable community water supplies, and knock-on biodiversity gains improving forest productivity.
Cumulative Effects	Scaling the solution could cumulatively reduce basin-level water stress, enhance regional carbon sinks, and build long-term resilience against future shocks (such as wildfires and lower precipitation levels).

After qualitatively assessing each solution against their evaluation checklist, the team translates their insights into a quantitative scoring to rate each solution's feasibility and effectiveness in building resilience (see Figure 5). The top-scoring solution was selected for presentation to senior leadership.

Figure 5: Scoring Mechanism for Selection of Solutions Based on Evaluation Criteria

		Solution					
		Conduct pilot studies to plant suitable native and fire-resilient trees		***Explore internal water loop reuse to reduce freshwater demand, and use treated water for wetland restoration***		***Upskill local and indigenous communities with sensor and monitoring technology to assess ecosystem services' health***	
Criteria	**Sub-Criteria**	Score	Average Score per Criteria	Score	Average Score per Criteria	Score	Average Score per Criteria
Strategic & Adaptation Fit		3	3	3	3	2	2
Co-Benefits & Trade-Offs with Climate Mitigation, Nature & People	Climate Mitigation	2	2	2	2.6	1	2.3
	Nature	3	2	3	2.6	3	2.3
	People	1	2	3	2.6	3	2.3
Sensitivity to Interactive Effects	Compound Effects	2	2.6	2	2.6	2	2
	Cascading Effects	3	2.6	3	2.6	2	2
	Cumulative Effects	3	2.6	3	2.6	2	2
Technical & Operational Feasibility		2	2	2	2	1	1
Average Score			**2.4**		**2.55**		**1.82**

Each criteria and sub-criteria is scored on a 0-3 scale:

0 – Negligible positive impact on climate resilience, low feasibility or strategic alignment and / or high risk of negative consequences on climate mitigation, nature and/ or people

1 – Limited positive impact on climate resilience, limited feasibility or strategic alignment, and / or a moderate risk of negative consequences on climate mitigation, nature and/ or people

2 – Moderate positive impact on climate resilience, moderate feasibility or strategic alignment, and / or a low risk of negative consequences on climate mitigation, nature and/ or people

3 – Strong positive impact on climate resilience with high effectiveness, feasibility, and strategic alignment and very low risk of negative consequences once any maladaptation risks are addressed

Throughout the scoring process, the team also factors the potential for intrinsic maladaptation risks of solutions to be mitigated through design refinement or stakeholder engagement

While negative impacts were reflected through lower scoring under each sub-criteria, the team's scoring system deliberately avoided a multiplicative approach where a single zero in one area due to a potential unintended consequence would nullify the entire solution's score.

This was a conscious choice rooted in the recognition that **adaptation solutions are often imperfect and involve trade-offs**. The purpose of this exercise was not to eliminate solutions prematurely, but to provide a clear and structured picture of both benefits and trade-offs for the executive team to have a full picture of solutions' potential. If a solution demonstrated strong benefits overall but carried a specific downside—such as a temporary disruption—that alone would not mean it would be disregarded. To ensure any systemic, high-severity risks (e.g., human rights or irreversible ecosystem damage) did not end up buried within the scoring system, the team recorded that risk to ensure it was avoided, minimized, or remediated in the design and implementation stages.

The framework was designed to highlight where potential trade-offs exist so they could be actively mitigated, through design refinement, stakeholder engagement, or adaptive management. Penalizing a solution too heavily at this early stage could discourage innovative or high-impact approaches that could be feasible if supported by the right safeguards.

This approach also reflected a broader systems view where few meaningful adaptation solutions are risk-free, but many can be shaped to reduce harm and deliver co-benefits. By not allowing one issue to eclipse all others in the scoring, the team encouraged PulpaNova to think critically, plan proactively, and avoid false precision in decision-making. Through this systems-based approach, PulpaNova ensured that any solutions put forward for senior leadership's consideration recognizes the interconnectedness of climate, nature, and human rights.

Recommendations Moving Forward

The following recommendations aim to support companies at varying stages of their adaptation journey in effectively leveraging our system-based approach as a way to recognize the interconnectedness of climate, nature, and human systems:

a. **Iterate and expand the assessment process.** PulpaNova's case study illustrates a common corporate approach, where climate scenario analysis and risk assessment are conducted at the group level and focus primarily on owned assets and key suppliers. However, BSR encourages companies to go further and incorporate all known suppliers in the value chain in physical climate risk assessments and vulnerability assessments. This broader scope enables a comprehensive view of the overall climate vulnerability and physical climate risk exposure beyond direct operations and across the value chain.

b. **Tailor the approach to reflect internal priorities.** While PulpaNova focused on climate as the starting point and primary driver for action, companies that begin their work from a foundation in nature or human rights could adjust the proposed approach to reflect their programmatic priorities and strategic objectives.

c. **Be thoughtful of how integration is applied.** PulpaNova illustrates a challenge many companies face today: there are still few cost-effective, widely available solutions that integrate climate, nature, and people into a single scenario or risk assessment. Faced with this limitation, the proposed approach offers a pathway for connecting and making sense of different data, tools, and results. It is critical to understand that not every step can be fully integrated or replicated—or that they require it. Leveraging specialized expertise from various fields is therefore crucial to this systems-based approach in order to adequately consider the right elements that define climate, nature, and human rights frameworks. As solutions and service providers grapple with these distinctions and expand the offering of joint assessments, BSR encourages companies to apply our proposed process to stress test these approaches and ensure their appropriateness.

d. **Engage stakeholders to ground adaptation in local realities.** While the proposed approach does not provide detailed guidance on stakeholder engagement, it is critical to involve internal and external stakeholders, including business units, suppliers, and communities, throughout the process. Risk assessment tools offer a valuable starting point, but they often lack context-specific insights (e.g., land tenure disputes or community reliance on local ecosystems) that only emerge through direct engagement. Beyond verifying risk assessment findings to ensure that they reflect precise and localized realities, these stakeholders should be engaged in the development of adaptation solutions to ensure that they are contextually appropriate, socially accepted, and effective on the ground.

e. **Integrate human rights due diligence.** Continue to expand on your integration of human rights within your adaptation approach by routinely conducting human rights due diligence. Ensure people impacts stemming from adaptation solutions are considered, planned for, and mitigated, and that if harm does occur, a

system and grievance mechanism is in place to effectively oversee and remedy the harm.

f. **Embed this systems-based approach within your adaptation planning process.** The proposed approach is meant to be used in combination with other adaptation planning frameworks, such as the World Business Council for Sustainable Development's (WBCSD) Adaptation Planning for Business Guidance and the Accelerate Climate Transition (ACT) Adaptation Methodology, that span across governance, financing, or implementation of adaptation solutions' considerations.

g. **Extend the application of our approach beyond adaptation.** Companies are invited to apply BSR's evaluation criteria (outlined in Step 5) to assess any initiative and solution across their sustainability portfolio, beyond climate adaptation, ensuring they avoid and mitigate unintended negative consequences on climate, nature, and/or people and maximize positive outcomes.

h. **Embed adaptation into your transition plan.** While climate transition plans typically focus on mitigation, adaptation is equally essential to ensure business continuity amid physical climate impacts. Integrating adaptation, along with nature and human rights considerations, into climate transition plans elevates its importance and promotes alignment of efforts with mitigation measures, thereby reinforcing an integrated approach to climate change. BSR recommends[9] embedding these concepts into an integrated plan to ensure a truly holistic and systems-based approach.

As the world moves beyond 1.5°C of warming, the margin for error has never been smaller. Companies can no longer afford approaches that risk maladaptation or overlook critical interconnections. Siloed strategies that treat climate, nature, and people in isolation can unintentionally create new risks and undermine resilience. To meet this moment, businesses must embrace systems-based approaches and holistic decision-making. Our framework is meant to lay the groundwork and we imagine a systems-based approach to resilience will continue to evolve. Our intention is that businesses invest more in adaptation that truly builds resilience.

9 BSR will be releasing a brief by the end of October 2025 on best practices for crafting integrated transition plans that consider climate alongside nature and people

Appendix

Glossary

Term	Description
Adaptation	Adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects. (TNFD, 2025)
Adaptation Planning	The strategic process of identifying and addressing immediate and long-term priorities for building resilience to climate change. Adaptation planning includes the financing, design, and implementation of adaptation solutions to address climate impacts and build resilience. (WBCSD, 2025)
Adaptation Solution	Practical actions, technologies, or policies that help communities, ecosystems, or economies prepare for, prevent, respond to, or recover from climate shocks and stresses. These can include infrastructure changes, policy reforms, or nature-based approaches. (WBCSD, 2025; GARI, 2024)
Asset	Any form of capital, tangible or intangible, that contributes to a company's resilience. This might include physical infrastructure, operations, ecosystems, social or contractual relationships, value chain actors, affected communities, etc. (BSR, 2025)
Biodiversity	The variability among living organisms from all sources, including inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part. This includes genetic diversity (diversity within species), species diversity (diversity between species), and ecosystem diversity. Biodiversity loss occurs when species and/or genetic diversity are lost to impacts such as habitat destruction and climate change. This loss of biodiversity has negative ramifications for the overall health and resilience of ecosystems. (Modified from TNFD, 2025)
Climate Adaptation	The process adjusting to the actual or expected climate and its effects to moderate harm or exploit beneficial opportunities. (IPCC, 2022)

Climate Resilience	The capacity of social, economic, and environmental systems to cope with climate-related hazardous events, trends, or disturbances, responding or reorganizing in ways that maintain their essential function, identity, and structure. (IPCC, 2022)
Co-Benefit	A positive effect that a policy or measure aimed at one objective has on another objective, thereby increasing the total benefit to society or the environment. (IPCC, 2022)
Cascading Impacts	Occurs when an extreme hazard generates a sequence of secondary events in natural and human systems that result in physical, natural, social or economic disruption, whereby the resulting impact is significantly larger than the initial impact. Cascading impacts are complex and multi-dimensional, and are associated more with the magnitude of vulnerability than with that of the hazard (modified from Pescaroli & Alexander, 2015). (IPCC, 2022)
Compound Impacts	Occurs from the interaction and combination of hazards, which may be characterized by single extreme events or multiple coincident or sequential events that interact with exposed systems or sectors. (Adapted from IPCC, 2022)
Cumulative Impacts	The changes to the environment, health, social, and economic conditions as a result of the multiple interactions among human activities and natural processes, which accumulate across time and space. (Adapted from Government of Canada, 2025)
Ecosystem Services	The contribution of ecosystems, including ecological processes or functions, to the monetary and non-monetary benefits that are used in economic and other human activity. These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance, (2) provisioning services such as food or fiber, (3) regulating services such as climate regulation or carbon sequestration, and (4) cultural services such as tourism or spiritual and aesthetic appreciation. (Adapted from IPCC, 2022; TNFD, 2025)
Maladaptation	Actions that may lead to increased risk of adverse climate-related outcomes, including via increased greenhouse gas emissions, increased or shifted vulnerability to climate change, more inequitable outcomes, or diminished welfare, now or in the future. Most often, maladaptation is an unintended consequence. (IPCC, 2022)
Opportunity	Activities that create positive outcomes for organizations and the environment by creating positive impacts or mitigating negative impacts on climate and nature. These activities can include efforts to mitigate and adapt to climate change, manage nature-related risks, and reverse the loss of nature. Positive outcomes can include reputational capital gain, market expansion, and increase in resilience. (Adapted from TCFD, 2021; TNFD 2023)

Physical Risk Assessment	The identification and quantification of hazards, exposure, and vulnerability posed by extreme weather and changing climate conditions to assets, operations, and value chains. A physical risk assessment covers both immediate and long-term hazards to allow the business to evaluate potential damage and disruptions. (WBCSD, 2025)
Resilience	The capacity to live and develop with change and uncertainty. It provides capacities for turning risks into opportunities. This includes: (1) adaptive capacities to absorb shocks and turbulence and avoid unpleasant tipping points, thresholds, and regime shifts; (2) capacities to prepare for, learn from, and navigate uncertainty and surprise; (3) capacities for keeping options alive and creating space for innovation; and (4) capacities for systemic transformation in the face of crises and unsustainable development pathways and traps. (TNFD, 2025)
Systems-Based Approach	A holistic approach of planning and evaluating solutions that recognizes the interconnectedness of climate, nature, and human systems. This approach ensures that decisions are holistic, forward-looking, and aligned with broader resilience goals. (BSR, 2025)
Trade-Off	A competition between different objectives within a decision situation, where pursuing one objective will diminish achievement of other objective(s). A trade-off exists when a policy or measure aimed at one objective (e.g., reducing GHG emissions) reduces outcomes for other objective(s) (e.g., biodiversity conservation, energy security) due to adverse side effects, thereby potentially reducing the net benefit to society or the environment. (IPCC, 2022)
Vulnerability Assessment	The estimation of the system's (e.g., a company's) propensity or predisposition to be adversely affected based on its level of sensitivity to hazards and adaptive capacity. (Adapted from IPCC, 2022; Carbone4, 2023)

Climate Adaptation Resources Available for Business Practitioners

The following section aims to increase the visibility of existing resources and direct sustainability practitioners to the most relevant guidance depending on the adaptation element they wish to address. While the table below is not exhaustive, it is a starting point to support companies in their adaptation journey.

Adaptation Element	What is a good place to dig deeper?
Foundations	WBCSD Adaptation Planning for Businesses; ACT Adaptation Methodology; Carbone4 OCARA Methodological Guide: These reports introduce the fundamental **concepts and definitions of adaptation and resilience** that align with international organizations such as IPCC, UNEP, UNFCCC, ADEME, ISO, or the World Bank.
Scope	ADEME How to Embark Your Company upon Its Climate Change Adaptation Journey?; NGFS Conceptual Note on Adaptation: These reports showcase **context-specific considerations** through case studies of companies working with local stakeholders to implement their adaptation strategy and specific regions' prioritization of adaptation measures based on their exposure to different physical climate risks. Carbone4 OCARA Methodological Guide: This report supports the identification of climate vulnerabilities across s**pecific sectors, economic activities, and processes** with relevant considerations for over 120 processes across the supply chain. British International Investment and FMO Climate Investment Playbook: This report highlights **sector-specific climate physical risk drivers and adaptation and resilience solutions across.** agriculture, forestry and fisheries, energy, manufacturing, real estate, transport, water, health, financial services, ICTs, and nature- based solutions.

Assessment	IIGCC Climate Resilience Investment Framework: The report presents the four-step physical climate risk assessment methodology (PCRAM) to help investors **assess and manage physical climate risks** while showcasing the benefits of resilience investments throughout an asset's lifecycle. WBCSD The Business Leaders Guide to Climate Adaptation and Resilience: This report outlines the **considerations and approaches to estimate current and future climate risks and assess and prioritize adaptation-related opportunities**. It also proposes key criteria for assessing adaptation solutions. British International Investment and FMO Climate Investment Playbook: This report provides a **checklist for investors to screen and conduct due diligence for adaptation and resilience solutions** before investing.
Stakeholder Engagement	Stakeholder Engagement: This Frequently Asked Questions (FAQ) outlines definitions for key terms (e.g., stakeholders, rightsholders, and stakeholder engagement), the **purpose, guiding principles, and best practices** for meaningful stakeholder engagement. Stakeholder Engagement in the Transition Context: Guidance for Practitioners: This report provides an overview of **critical elements for stakeholder engagement in a transition context, the different stakeholder groups for engagement**, and case studies for a just transition. Co-creating Climate Justice Interventions between Business and Communities: This report highlights the **benefits and challenges, guiding principles, and the phases of a co-creation approach** for climate justice.
Synergies and Trade-offs	ITPN Building Climate-Ready Transition Plans: Including Adaptation and Resilience for Comprehensive Transition Planning: This report provides **considerations to assess synergies and trade-offs between mitigation and adaptation** when delivering transition plans. It also illustrates examples of solutions with trade-offs for adaptation or mitigation and those that are a win-win for both adaptation and mitigation. WEF and PwC Accelerating Business Action on Climate Change Adaptation: This report highlights protecting communities and ecosystems as key to adaptation and **provides guidance distinguishing between revenue-generating solutions and ecosystem management practices with co-benefits for the community**.

Strategy	Carbone4 OCARA Methodological Guide: The report provides guidance and an open-sourced toolkit for **assessing site-specific climate resilience prior to making decisions on adaptation**, based on the criticality of the process and its vulnerability under climate hazards.
Organizational Levers	ACT Adaptation Methodology: The report details key **components of a comprehensive adaptation plan and offers a scoring system to assess the maturity of the adaptation plan**. WBCSD Adaptation Planning for Businesses: The report provides **step-by-step guidance for the corporate adaptation planning process**, including considerations, governance mechanisms, decision-making and stakeholder engagement frameworks, best practices, and case studies. WBCSD The Business Leaders Guide to Climate Adaptation and Resilience: The report complements the previous report and highlights the **roles and priorities for the C-suite** in the adaptation journey.
Implementation	ADEME How to Embark Your Company Upon Its Climate Change Adaptation Journey: This guidance outlines **success factors and difficulties** faced by 30 French companies in their **adaptation planning and implementation process**. WBCSD Adaptation Planning for Businesses: This report provides considerations for the **development of adaptation metrics and outlines different types of metrics to measure the effectiveness of adaptation solutions**, including avoidance of costs and improved employee health and safety. British International Investment and FMO Climate Investment Playbook: This report outlines **different impact metrics that can be used to quantify how climate adaptation investments can support people, the planet, and the economy**.

Examples of Country-Level Indicators for Human Rights Scan

Human Rights Category	Indicator	Indicator Description
Child Labor	Children's Rights in the Workplace Index	The Children's Rights in the Workplace Index evaluates child labor within five issue categories, which are measured by three types of indicators: legal framework, enforcement and outcome indicators.
Civil and Social Rights	Freedom House—Freedom in the World	Freedom House's flagship annual report, assessing the condition of political rights and civil liberties around the world.
	Social Progress Imperative—Social Progress Index (SPI)	The SPI measures the well-being of a society by observing social and environmental outcomes. This covers wellness (and within wellness, including health, shelter, and sanitation), equality, inclusion, sustainability, and personal freedom and safety.
Conflict and Security	Global Peace Index (GPI)	Produced by the Institute for Economics and Peace (IEP), the Global Peace Index (GPI) is the world's leading measure of global peacefulness and uses 23 qualitative and quantitative indicators and measures the state of peace across three domains: the level of Societal Safety and Security, extent of Ongoing Domestic and International Conflict, and the degree of Militarization.
	TDi CAHRA (Conflict-Affected and High- Risk Areas) Index	The TDi CAHRA Index grades the likeliness that a country could meet the OECD definition of a CAHRA, as either high, moderate, or low by combining eleven indices published by international institutions and civil society bodies to produce the TDi CAHRA Index. The 11 indices measure the prevalence of conflict, corruption, and governance weaknesses, and shortcomings in human rights and labor rights.
Development	UNDP Human Development Index	The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable, and having a decent standard of living.

Forced Labor	Global Slavery Index Government Response	The Global Slavery Index measures the extent of modern slavery country by country, and the steps governments are taking to respond to this issue.
Gender Equality	UNDP Gender Inequality Index (GII)	The UNDP Gender Equality Index (GII) measures gender inequalities in three important aspects of human development—reproductive health, empowerment, and economic status. A low GII value indicates low inequality between women and men, and vice-versa.
Governance	Transparency International Corruption Perceptions Index	The Corruption Perceptions Index (CPI) is an index published annually which ranks countries by their perceived levels of public sector corruption, as determined by expert assessments and opinion surveys.
	World Bank Governance Indicators—Rule of Law	World Bank Governance—Rule of Law indicator captures governance perceptions in a specific country based on a survey of nongovernmental organizations, commercial business information providers, and public sector organizations. This includes the extent to which survey respondents have confidence in and abide by the rules of society (e.g., quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence).
Humanitarian Risk	The European Commission Disaster Risk Management Knowledge Centre (EC DRMKC)—INFORM Risk Index	INFORM is a collaboration of the Inter-Agency Standing Committee Reference Group on Risk, Early Warning, and Preparedness and the European Commission. The INFORM Risk Index is a global, open-source risk assessment for humanitarian crises and disasters that was created to support decisions about prevention, preparedness, and response.
Working Conditions	ITUC Global Rights Index	The ITUC Global Rights Index ranks the world's worst countries for workers by rating 144 countries on a scale of 1 to 5+ based on the degree of respect for workers' rights.

Additional Guidance on Steps 4 and 5 of the Approach

Step 5: Develop Evaluation Criteria for Solutions

The evaluation criteria in the guidance serve as a holistic set of considerations for PulpaNova to account for when selecting the most suitable adaptation solution. The following figure presents additional prompting questions that companies can consider when assessing potential co-benefits and trade-offs for each solution:

FIGURE 7: Prompting Questions for Assessment of Potential Co-Benefits and Trade-Offs across Climate, Nature, and Human Rights for Each Solution

	Co-Benefits	Trade-Offs
Scope	• Which stakeholders (e.g. climate, ecosystems, community, suppliers) will benefit from the measure? • How many people/ecosystem services will likely benefit from the measure? • What is the geographical coverage of stakeholders that will benefit from the measure (e.g. workers at the operational site, neighboring communities/nearby ecosystems, habitats or species)?	• Which stakeholders (e.g. climate, ecosystems, community, suppliers) will be at risk of unintended consequences from the measure (e.g. flood risk for a supply chain site)? • How many people/ecosystem services will likely be impacted from the measure? • What is the geographical coverage of stakeholders that will be impacted from the measure (e.g. workers at the operational site, neighboring communities/nearby ecosystems, habitats or species)?
Scale	• What are the potential co-benefits to climate/nature/people (e.g. preservation of cultural heritage, improved air quality, etc.)? • How impactful is the measure in providing these co-benefits?	• What are the potential trade-offs to climate/nature/people (e.g. increasing energy demand/ increasing water usage and thereby risk of water stress/disruption of biodiversity behavioral patterns)? • How impactful are the unintended negative consequences of the measure (can the adverse impacts be avoided/minimized/offset)?
Contribution	How significant is the measure's contribution to the co-benefits?	How significant is the measure's contribution to these unintended negative consequences? (i.e. Did it directly create a negative impact or indirectly/directly exacerbate the negative impact?)
Likelihood	What is the likelihood that the intended benefits will materialize (within the next 1-2 years, next 3-5 years, 5-10 years, beyond 10 years)?	What is the likelihood that the unintended consequence will materialize (within the next 1-2 years, next 3-5 years, 5-10 years, beyond 10 years)?
Remediability	NA	• Will remedy restore the victim or the environment to the same or equivalent position as before the harm? • How feasible would it be for the company to implement such remedial actions (considering cost, resources, expertise, partnerships with on-the-ground organization, etc.)?

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