FOREST COMMODITY FINANCE

IMPLICATIONS FOR SOUTHEAST ASIA'S POLICY MAKERS

February 2021

CONTENTS

EXECUTIVE SUMMARY

Singapore, Malaysia and Indonesia are central to global Forest Risk Commodity production. Singapore acts as a finance conduit to many companies financing or directly involved in production whilst Malaysia and Indonesia account for between 85-90% of global palm oil production[1].

Southeast Asia
is home to
15%
of the world's tropical rainforests, around 20% of global plant, animal and marine species[3] and significant stores of carbon

Southeast Asia is also home to 15% of the world's tropical rainforests[2] which are home to around 20% of global plant, animal and marine species[3] and significant stores of carbon. Trade-offs between conservation and economic development means forests are under serious threat, with some parts of Indonesia and Malaysia projected to lose up to 98% of their remaining forests in the next nine years[4].

This policy brief uses a novel approach to assess and understand the risks faced by Financial Institutions (FIs) and Forest Risk Commodity (FRC) producers from climate and land use change. The findings quantify the expected aggregate impact of forest and climate change risk on the near-term financial performance of the sector, which result in increased Probability of Default (PD) if the risks are not mitigated. The analysis highlights the most influential intervention points to minimize risks, which also contribute to decoupling forest and climate change risk from economic growth.

Many risk modeling approaches are based on historic trends. Due to the evolving nature of forest and climate risk[i], those methods can mis-estimate the true impacts. In this analysis KPMG's Dynamic Risk Assessment (DRA) relies on expert elicitation[ii] and network theory to identify and generate an interconnected assessment of risks, it is an alternative method which overcomes data limitations. The method taps into the knowledge and experience[iii] of finance and commodity market experts to generate a list of key risks from which the likelihood, severity, near-term scenario, velocity and connections are established[5].

The analysis identified 19 individual risks relevant to finance and production of Southeast Asian FRCs. Within this four key clusters of risks are expected to rapidly affect each other in a cascading effect when any individual risk is triggered. The risk clusters are:

Political Scenarios

Concentration Risk

Customer Sentiment

Fire Risk

i. Hence the requirement for Expert elicitation.

ii. Expert elicitation is used when data is not available, of poor quality or past data is not expected to be representative of the future.

iii. How experts assimilate information. They are (i) experienced, (ii) widely read, (iii) adjust their views to new information, (iv) open-minded and (v) self-correcting. As such, they sense all the time whether they may need to readjust their views, which refers to their sensing capacity.

The analysis predicts that Fire Risk has the potential to affect FRC producers' revenue by 24% and the Concentration Risk[iv] cluster can reduce revenue 22% within a period of 33 months should any one of the risks be activated.

These clusters pose the greatest material risk to banks due to the expected and significant impact on the possibility of stranded assets, loss of biodiversity and ecosystems collapsing, which in turn increases the Probability of Default. This will impact a borrower's cashflow and consequently repayments to the lender. Deteriorating repayment capability and increased impairments are to be expected with possible repercussions for FRC producers in terms of future access to capital and availability of funding for sustainable and profitable forest commodity production. This affects lenders' returns, especially when the cumulative impact of lending to many FRC producers (which is common) is considered. Repercussions include negative impacts on the health and stability of local communities and national economies relying on the FRC sector and impacted by the banking sector. This is particularly relevant for Malaysia and Indonesia.

The list below reveals the seven most influential individual risks from the risk list. The most efficient mitigation strategy to reduce risk across the entire network of nineteen risks is to prioritize mitigating:

Climate Change

Ethical & Sustainable Supply Chains

Pace of Regulation

Political Situation

Rule of Law

Fire Risk

Transition Pathways

We recommend four immediate actions to support policy makers, regulators and FIs to understand and manage forest and climate change risk:

1. **Promote & improve meaningful and integrated disclosures** - improved disclosures on climate change and forest risk, that are integrated with financial disclosures, allows for better decision making, monitoring and assessment of risk by both FIs and regulators.
2. **Assess risks holistically instead of individually** - quantify linked risks using financial models to understand and manage their magnified aggregate outcomes.
3. **Implement mitigating actions that target the most influential individual risks** - *including Climate Change, Ethical & Sustainable Supply Chains, Pace of Regulation, Rule of Law, Political Situation, Fire Risk and Transition Pathways*. Such actions translate primarily into enhanced disclosures and due diligence practices.
4. **Focus on preventing impactful risk clusters from materializing** - bring *Biodiversity and Concentration, Reputation Issues and Changing Customer/Community Attitudes* to the top of the agenda for policy makers, regulators and banks.

iv. The 'Concentration Risk cluster' includes Biodiversity and Concentration, Climate Change and Vulnerability to Pests and diseases

INTRODUCTION

Southeast Asia is rich in natural assets and is home to 15% of the world's tropical rainforests[2]. These forests contain some of the world's richest biodiversity, encompassing around 20% of global plant, animal and marine species[3].

30%

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98%

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Tropical forests are essential stores of planetary carbon accounting for 30% of the world's carbon stores. Yet they are under serious threat, with some parts of Indonesia and Malaysia projected to lose up to 98% of their remaining forests in the next nine years[4].

Southeast Asia is a globally significant producer of Forest Risk Commodities (FRCs) including palm oil, timber, pulp, coffee and cocoa. Production of these commodities plays a significant role in contributing to the region's economic development. The production and trade of palm oil in Indonesia and Malaysia largely account for the countries' macroeconomic growth; in 2017 the two countries accounted for between 85-90% of global palm oil production with vast majority of the products being exported[5]. Tensions between economic growth and commitments to environmental protection have led to inconsistent forest management which has resulting in significant deforestation. Continued, sustained forest loss poses risk to economic development, biodiversity and climate stability.

Singapore's strategic location and status as a financial hub in Southeast Asia has resulted in numerous FRC companies and multinational consumer goods corporations being based out of the city-state. As such it is considered a significant nation within the regional FRC context. Singapore, Malaysia and Indonesia are all signatories to the 2015 Paris Agreement and have set Nationally Determined Contributions (NDC) in line with their commitments[6]. As part of leveraging the financial sector to support the implementation of the Paris Agreement goals, all three financial regulators have joined the Network for Greening the Financial System (NGFS)[7].

Changes in climate and land use present unique risks to the economies, businesses and individuals that depend on them. Climate change and deforestation are expected to have near-term consequences for financial institutions (FIs) with exposures to the Forest Risk Commodity (FRC) industries. Physical risks such as fire and reputational damage from changing consumer attitudes are expected to result in imminent and significant credit losses if they are not better understood and managed.

Financial institutions use a variety of risk management models that estimate probability of default (PD) and loss given default (LGD)[8]. Using historic data, these models project the possible losses on their lending portfolios, for example forecasting the future repayment capabilities of an FRC borrower. Where new and emerging risks are identified, such as the COVID-19 pandemic, data availability and quality can limit the analysis. Due to the emerging and evolving physical and transition risks posed to lenders from climate change and forest loss, these transition risks management models fail to fully address the dynamic nature of the unfolding situation and as a result, misestimate the risk and how to manage it.

In this situation, the business and financial performance of FRC borrowers is expected to deteriorate faster and more severely in the near term because of a changing climate and will consequently exacerbate the tension between economic growth and environmental protection. Unless more routine and appropriate risk assessment is carried out by the sector, particularly by financial institutions, the severity of the impacts will continue to be unknown, as will the actions needed to mitigate the undesired economic, social and environmental consequences.

There is no one approach to addressing these complex challenges and the needs of diverse stakeholders with competing priorities. However, the financial sector is well positioned to catalyze change through their lending activities due to the large volume of capital they supply. The top 20 Singaporean, Malaysian and Indonesian banks alone represented 37% or US$23 billion of total global lending to the Southeast Asian FRC sector between 2011 and 2018[9]. And as both local and international financial institutions invest and lend extensively to the Southeast Asian FRC sector, particularly palm oil[10], it is critical to address their role in financing deforestation and land use change, as well as how the associated risks affect their portfolios and potentially the economic stability of a country.

This brief looks at the current practices in forest commodity production and forest management to understand what the scale of the risk is to financial institutions in terms of borrower's credit worthiness. By looking at the risks and their scale more closely, the brief explores how targeted policy can be used as an instrument to de-risk the sector through better forest and climate management.

This policy brief is arranged as follows:

- **Sustainable Financial System policy landscape:** a review of relevant policies that have shaped forestry conditions and financial supervisory practices in Southeast Asia
- **Method:** an introduction to the DRA methodology and process undertaken
- **Results:** presenting the key findings from the Dynamic Risk Assessment including the risk list, risk clusters, and mitigation strategy
- **Summary and recommendations:** Suggested actions and policy interventions for regulators, policy makers, financial institutions and FRC producers based on the results

SUSTAINABLE FINANCIAL SYSTEM POLICY LANDSCAPE

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Investors
with combined assets of US$16.2 trillion, have called for aggressive corporate action to eliminate deforestation in their supply chains and across their industries

Southeast Asian and East Asian lenders that contribute most to Southeast Asian FRC financing are increasingly forced to consider the risks of their financial contributions, including the risk of a firm's failure to repay loans.

It is apparent that investors' concern over deforestation risks is already growing; at the 2019 UN Climate week, 230 investors worth US$16.2 trillion in assets called for aggressive corporate action to eliminate deforestation in their supply chains and across their industries[11].

Financial regulator commitments

Indonesia

In December 2014, Otoritas Jasa Keuangan (OJK) launched its 2014-2019[12] Sustainable Finance Roadmap with detailed targets for the financial sector to mitigate the impact of climate change, enabling a shift toward a competitive low-carbon economy and environmentally friendly investments. The key objectives of this roadmap are (1) increase funding from FIs for green projects; (2) increase demand for green financial products and services; and (3) increase supervision and coordination of the implementation of sustainable finance[13].

Under this roadmap, OJK Regulation No. 51/POJK.03/2017 was introduced to strengthen the commitment to support sustainable finance by requiring FIs, issuing companies and public companies to implement sustainable finance principles in their operations. This regulation also mandates FIs to outline their sustainable financial initiatives directly to OJK. Following this, OJK and WWF Indonesia piloted a project to build capacity of eight first mover banks, representing approximately 46% of national banking assets, to integrate ESG principles into the business model[14].

In Early 2021, OJK published its Sustainable Finance Roadmap Phase II (2021-2025). The highest priorities will be to continue the development of a green taxonomy, implementation of ESG standards and innovation of financial products and services.

Malaysia

In September 2019, Bank Negara Malaysia (BNM) formed the Joint Committee on Climate Change ("JC3") to strengthen the Malaysian financial sector's role in the country's transition towards a low-carbon economy through a collaborative effort between BNM, Securities Commission Malaysia, and 19 industry players[15]. The Malaysian government has also allocated a portion of its 2021 budget towards sustainability efforts, including encouraging the private sector to participate in green technology and the issuance of sustainability bonds[16].

Singapore

The Monetary Authority of Singapore (MAS) is pushing for deeper ESG integration within Singapore's financial institutions. In 2019, MAS launched the Green Finance Action Plan[17] outlining a pathway to strengthen resilience to environmental risks, develop financial solutions for a sustainable economy, leverage technology in building sustainable finance markets, and build capabilities in sustainable finance[18].

Key objectives of the Green Finance Action Plan include: (1) environmental risk management guidelines across banking, insurance and asset management sectors; (2) establishing a US$2 billion green investments program to invest in public market investment strategies that have a strong green focus; and (3) develop grant schemes to support mainstreaming of green and sustainability linked loans[19].

Supporting technical guidelines

Indonesia

In 2017, OJK introduced the Technical Guidelines for Banks which aimed to steer lending towards forestry-related sustainable practices[20]. The guidelines also expect banks to use sustainable certifications, such as the Roundtable on Sustainable Palm Oil (RSPO) certification, a requisite for financing in the palm oil sector.

In December 2019, OJK published the Guidelines for Financing Palm Oil to improve banks' understanding of the business process of the palm oil industry in hopes of enabling sustainable financing practices[21]. The guidebook outlines the requirements for financing towards palm oil, the main considerations for banks in financing palm oil, integration of ESG principles into banks' risk management policies, as well as the alternative sustainable financing schemes that banks can implement for the palm oil industry. In addition, OJK is also currently developing a positive list taxonomy to guide lending decisions by financial institutions towards ESG-based sectors.

Malaysia

BNM introduced its first set of sustainable environment related guidelines for Islamic banks in 2018, which require Islamic banks to evaluate issues such as biodiversity loss, deforestation, and greenhouse gas emissions in lending decisions to the palm oil sector.

In December 2019, BNM launched a discussion paper on "Climate Change and Principle based Taxonomy" for the development of a national green taxonomy to guide lending towards sectors that support a low carbon economy. It has two key objectives:

- identify and classify economic activities that contribute to climate change targets;
- build capacity in managing the financial risks from climate change.

A revised version of the taxonomy, based on the feedback received from more than 80 institutions, is planned to be published in early 2021.

In 2019, BNM also published the Value-Based Intermediation Financing and Investment Impact Assessment Framework-Guidance (VBIAF). The VBIAF enables the implementation of an impact-based risk management system to assess the financing and investment activities of Islamic financial institutions, incorporating ESG considerations in their risk management systems. In late 2020 a public consultation for the VBIAF sectoral guidelines on palm oil, renewable energy, and energy efficiency was held[22], the results of which are expected in 2021.

Singapore

MAS introduced Guidelines for Environmental Risk Management[23] in December 2020 for banks, asset managers and insurers with the aim to drive Singapore's transition to an environmentally sustainable economy.

The MAS guidelines highlight that environmental risk poses potential financial impact on financial institutions' portfolios and activities through physical and transition risk channels.

Green bonds

Indonesia

The Asian green bond market has started to develop only recently but progress is encouraging. In Indonesia, OJK's Regulation No. 60/POJK.0.4/2017 was launched to regulate the issuance of green bonds and green sukuk.

Proceeds are required to be directed towards eligible green projects under key sectors. As of 2019, sovereign and corporate green bond and sukuk issuance in Indonesia reached US$2.7 billion, ranking first in Southeast Asia[24].

Malaysia

The issuance of green bonds and green sukuk in Malaysia refers to the ASEAN Green Bond standards published by the ASEAN Capital Markets Forum (ACMF), which outlines the eligible recipients of the proceeds from these bonds[25].

As of June 2020, 12 green sukuks, two social bonds, and three sustainable bonds have been issued in Malaysia, amounting to US$2.09 billion in issuance value[26] from corporates, banks, and the sovereign wealth fund.

Singapore

MAS encourages the issuance of green bonds under its sustainable bond grant scheme, which covers eligible issuers' expenses incurred for the external review of their proposed green bonds[27]. In 2019, MAS announced its US$2 billion Green

Investments Programme[28]. The first investment will be a US$100 million placement in the Bank for International Settlements Green Bond Investment Pool to support the development of the country's green bond market.

METHOD:
APPLYING THE DYNAMIC RISK ASSESSMENT

The financial and business implications of climate change, deforestation and land use change may not be immediately clear, easily measured or modelled[29]. This is exacerbated by the limited awareness and understanding of these complex relationships.

To overcome this, the Dynamic Risk Assessment (DRA[v]) was used as it offers a novel approach to identify and better understand the relationships between risks, in this case FRC productivity and borrowers' credit worthiness. It does so by building on a two-dimensional approach to risk management, constructing a network from risks identified in interviews with experts in forest risk commodities and finance industries. The DRA principle is shown in Figure 1.

Following the identification of the key risks, each expert is asked to complete a survey where they relate and independently rank the risks according to severity and likelihood. The risk scales are detailed in table 4. Velocity is added as a new dimension to provide a timeframe perspective on how rapidly risks will impact the FRC industry once triggered.

Table 4 - Risk scales

Severity - impact on sector revenue (% decrease)	**Major**	**Significant**	**Moderate**	**Low**	**Minor**
	30%-100%	10%-30%	3%-10%	1%-3%	<1%
Likelihood - the chances of a risk event occurring	**Almost certain**	**Likely**	**Possible**	**Low**	**Minor**
	30%-100% (1 per year)	30%-100% (1 per year)	3%-10% (1-in-10 years)	1%-3% (1-in-30 years)	<1% (1-in-100 years)
Velocity - the speed at which a risk impacts an entity	**<3 months**	**6 months**	**12 months**	**24 months**	**48 months**

v. For more information on KPMG's DRA, please refer to the risk list.

A risk network is generated from the survey completed by experts, the results are defined as:

1 **Risk clusters** - groups of three or more linked risks as identified by the panel of industry experts. These are near-term scenarios that are most expected to happen.

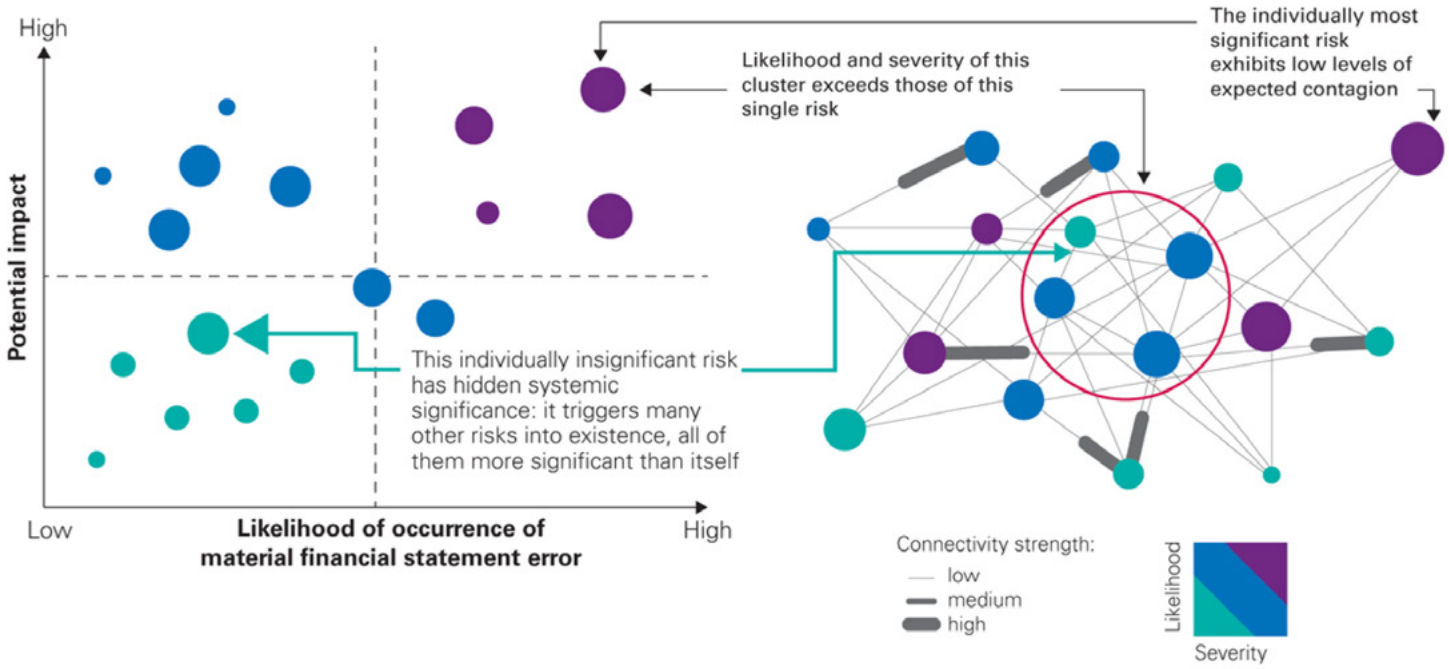
2 **Vulnerable risks** - the most affected risks within the network. The greater the number of other risks that affect the risk, the more vulnerable it is. Due to their vulnerability these risks should be protected with attention focused on the risks that rank the highest.

3 **Influential risks** - the most effective risks in the network. The most influential risks can affect the largest number of other risks in the network. Due to their influence, they are the intervention points within the network that be used to mitigate risk. Priority intervention points are those that rank highest.

4 **Velocities** - the length of time taken for risks to impact from them being triggered to peak severity.

5 **Revenue impacts** - the findings of the network analysis are extrapolated in terms of default risk to quantify the potential severity of the impact on a lender's portfolio.

Figure 1 - Dynamic Risk Assessment's three-dimensional and inter-connected view



RESULTS

Risk list

Between October and November 2020, 16 experts from 14 organizations contributed to interviews. Experts represented geographies across Asia, Europe and the UK. They represented regulators, Non-Governmental Organizations (NGOs), FRC companies, think tanks, financial institutions and the forestry sector. Interviews were conducted by KPMG to construct the initial list of 19 risks. Although the experts do not represent the whole FRC industry, they are indicative of the FRC sector given their expertise, industry knowledge and geographical spread[vi]. The list and descriptions of the risks are detailed in Table 5.

Table 5 - List of risks to the FRC sector

No.	Risk name	Risk description
1	**Biodiversity and Concentration**	Over-reliance on a few crops, including decisions on crops of the future, exposes industry and consumers to concentration risk. Increases vulnerability to pests and diseases that can result in supply shocks.
2	**COVID-19 Consequences**	Lockdowns may prompt increased illegal logging and deforestation activities whilst reducing access to overseas workers and labor.
3	**Changing Customer / Community Attitudes**	Demand for FRCs impacted by changing purchasing patterns, news, misinformation, populism or substitutes. Includes community hostility to big businesses. Extends to importers (e.g. China) deciding on escalating importation requirements.
4	**Climate Change**	Increasingly extreme climatic conditions and weather events result in land damage, equipment and infrastructure impairment and possible loss of life. Impacts costs, operations and sales. Changing weather conditions (e.g. drought) further expected to pave the way for new diseases and pathogens.
5	**Data Availability and Accuracy**	Data availability, accessibility and accuracy for tracing / certification are key components of transparency and better crop management. Unverifiable / inaccurate data reduce trust & increase costs of operation, eroding margins. Risks detected only after the event.
6	**Ethical & Sustainable Supply Chains**	Disproportionate reliance on certification methodologies that are based on sampling and digital traceability mechanisms result in ethical risks / exposures not being understood and non-compliance to standards not being challenged.
7	**FRC Price Volatility**	Extreme volatility in and perturbations of FRC prices generate uncertainty for investment in, planning and financing of FRCs. Uncertainty regarding shape and speed of recovery.
8	**Financing / Refinancing**	In a capital-intensive sector, financiers are increasingly sensitive to involvement / association with an industry that may be accused of deforestation / harming the environment. Limits future funding. Overstretched fiscal budgets cannot assist / provide backing / step in to resolve current disputes.
9	**Fire Risk**	Increase in / impact of fires generate supply chain shocks and, increasingly, creating a 'non-insurable' risk. Proper measures and disclosures for forest fire prevention are required beyond the ones already captured in for example RSPO certification.

vi. Readers and users should acknowledge that graph (or network) theory is but one approach to analyze the key risks for an organization, and that other analyses may also be appropriate. Limitations of the approach adopted include:

- The analysis is based on survey data which represents the opinions of the survey respondents.
- We have not independently verified the survey responses.
- The approach adopted is based on one application of graph (or network) theory. Adopting alternative approaches may result in different results.
- A range of analyses should be considered before making decisions.

No.	Risk name	Risk description
10	**Fraud, Corruption, Non-Compliance and Improper Practices**	Proliferation of regulatory requirements and pressure from interest groups nudge industry participants to take shortcuts. Can result in improper practices, non-compliance, corruption and / or fraud. Includes e.g. obtaining fraudulent community consent, stopping fertilization in years before planned sale.
11	**Inadequate Due Diligence Procedures**	Insufficient due diligence procedures, also in terms of ownership / control, result in over-reliance on certifications, increases in out of sample risks, excessive reliance on company disclosures and blind spots to the possibility of existing damage (e.g. wind) and emerging threats (drought tracking).
12	**Inconsistent Industry Governance**	Absence of uniformity across the industry, internationally as well as domestically, in addressing forest and climate change risk. Divergent frameworks and standards generate opportunities for arbitrage, fail to capture industry risks consistently and result in confusion and incorrect expectations.
13	**Nitrogen Runoff & Deterioration of Water Quality**	The risk of fertilizers not being applied in the proper manner / quantity / at the right time result in the risk of significant increases in nitrogen and phosphorus levels of stream banks.
14	**Pace of Regulation**	Risk of not keeping pace with integrated reporting, EU-directive on biofuels, carbon pricing / Omnibus law in Indonesia, which is a key driver of the value in the preservation of forests. Sector's inability to comply in time with speedy changes - locally and abroad.
15	**Political Situation**	Erratic / myopic / unstable locally driven geopolitical decisions impair proper implementation of rules, free trade, alter trade agreements and / or otherwise disrupt international trade. Potential for short term domestic consequences to 'force' relaxation of regulation to avoid internal shocks.
16	**Reputation Issues**	Reputational damage when found / alleged to be involved with / financing of, directly or by association, unacceptable practices - deforestation, objectionable labor / migrant worker practices, social / wildlife displacement, decline in community wellbeing and / or resources / community conflict.
17	**Rule of Law**	Lack of clearly defined / documented titles, especially for Indonesia, results in land ownership disputes and conflicts. Enforceability of property rights remains challenging and leads to increased risks and unresolved disagreements. Includes lack of official, accurate maps / mapping.
18	**Transition Pathways**	Trade-off between developing better farming practices / methods & the need to safeguard livelihood of smallholders (e.g. in Malaysia & Indonesia) leads to transition risk; i.e. the risk that guidance is not provided, and the transition is mismanaged - resulting in financial / biodiversity loss.
19	**Vulnerability to Pests and Diseases**	Impact of diseases (e.g. Ganoderma & Casava Mosaic) on monocrops impact plantations in Indonesia and Malaysia. Restricts future revenue generation, increases risk of deforestation & adversely affects ability of smallholders & plantation managers to survive off diminishing yields.

Dynamic Risk Assessment

Figure 2 shows a traditional assessment that rates the likelihood and severity of the individual risks. Based on a siloed perspective of the risks identified, *Climate Change* is perceived by the experts to be the most severe and likely risk to occur. The *Political Situation* is the least likely and least severe stand-alone risk. The remaining risks are all rated as significant and likely to occur. In making these observations, the limitations of the traditional assessment method are evident:

- it is difficult to prioritize due to the similar impact and likelihood rating seen in their dense grouping;

The results suggest this grouping of risks has similarly expected impact;

- holistic mitigation is absent as relationships between risks are not addressed and intervention actions are seen as applying only to each risk in isolation. This is resource intensive and burdensome; and
- the traditional method fails to help us comprehend the relationships between risks, their overall impact and magnitude.

Figure 2 - Individual risk severity

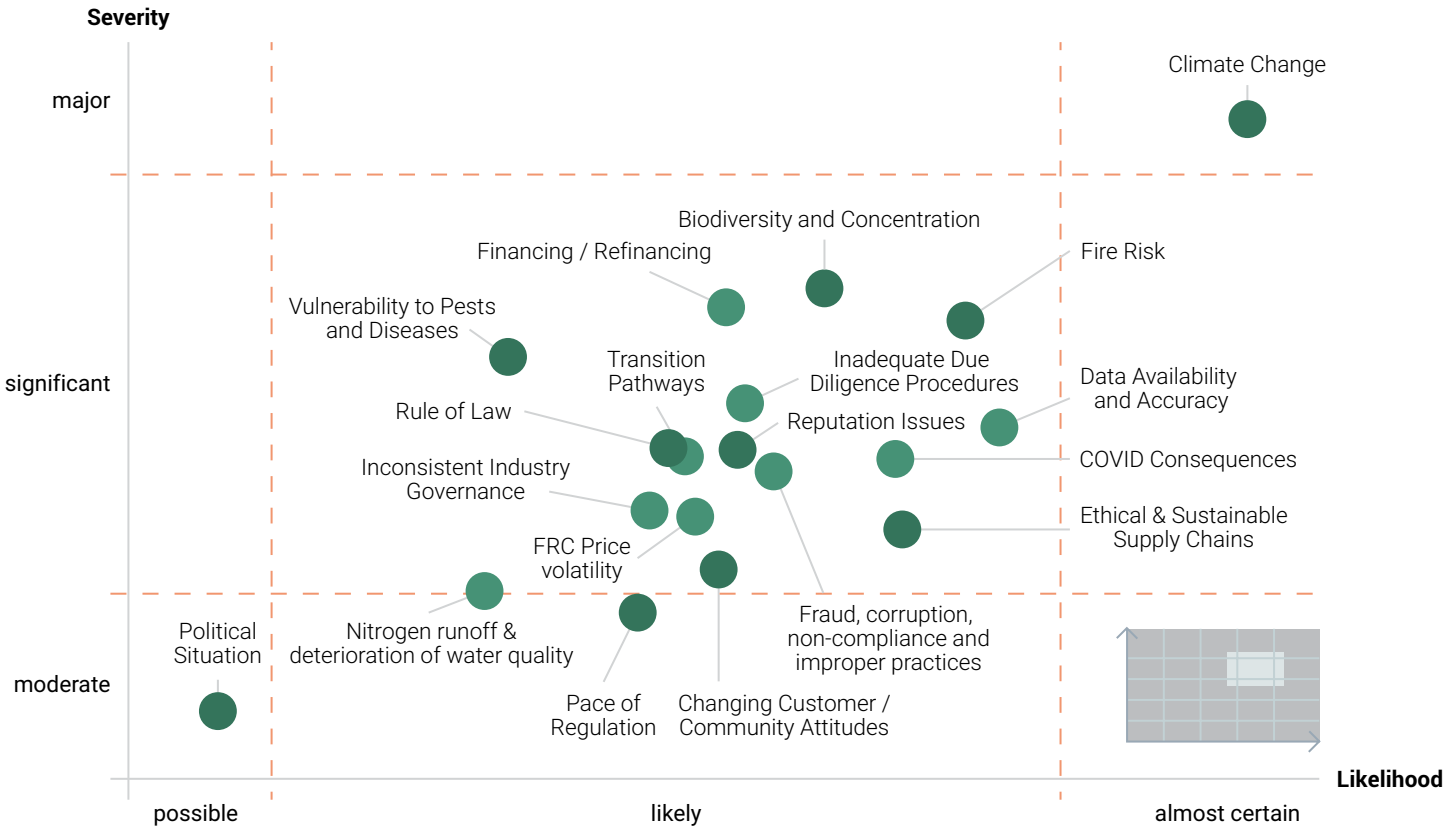
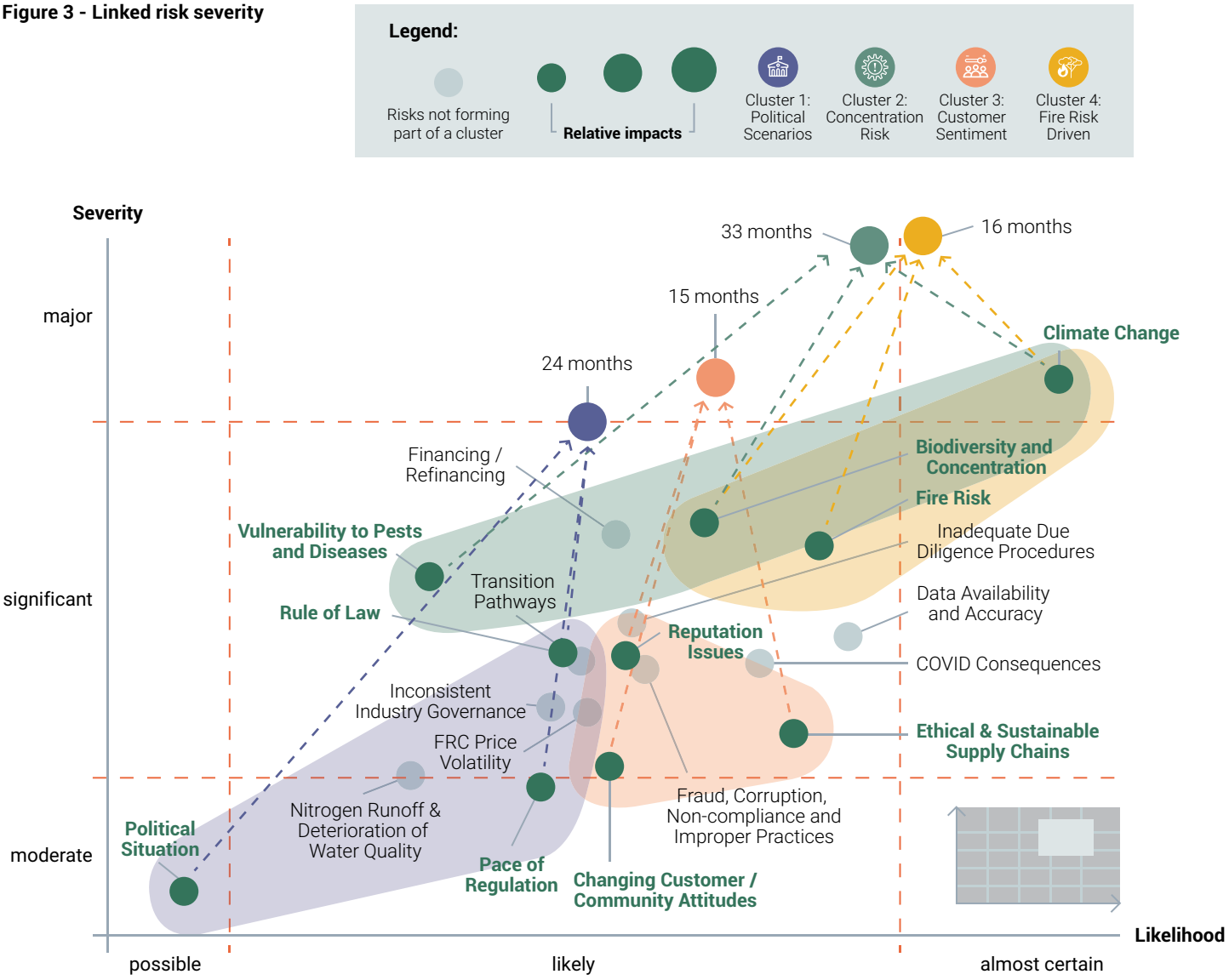


Figure 3 shows the results of the Dynamic Risk Assessment. It is based on experts' network view of risks which considers contagion relationships and the impact, rate and speed of risks. The analysis reveals that the experts strongly agree that four clusters of risk themes exist, named: *Political Scenarios, Concentration Risk, Customer Sentiment* and *Fire Risk*. The groups of risk can combine and have greater consequences for the forest commodities industry and financial sector when they materialize. The expected time to impact for the clusters is shown next to each color-coded sphere. The velocities of these risk clusters are alarmingly fast, ranging from 15 to 33 months, suggesting the impacts will be acute and difficult to manage. Urgent action is required to prevent these risks from being triggered rather than to react only once a risk materializes.

Figure 3 - Linked risk severity

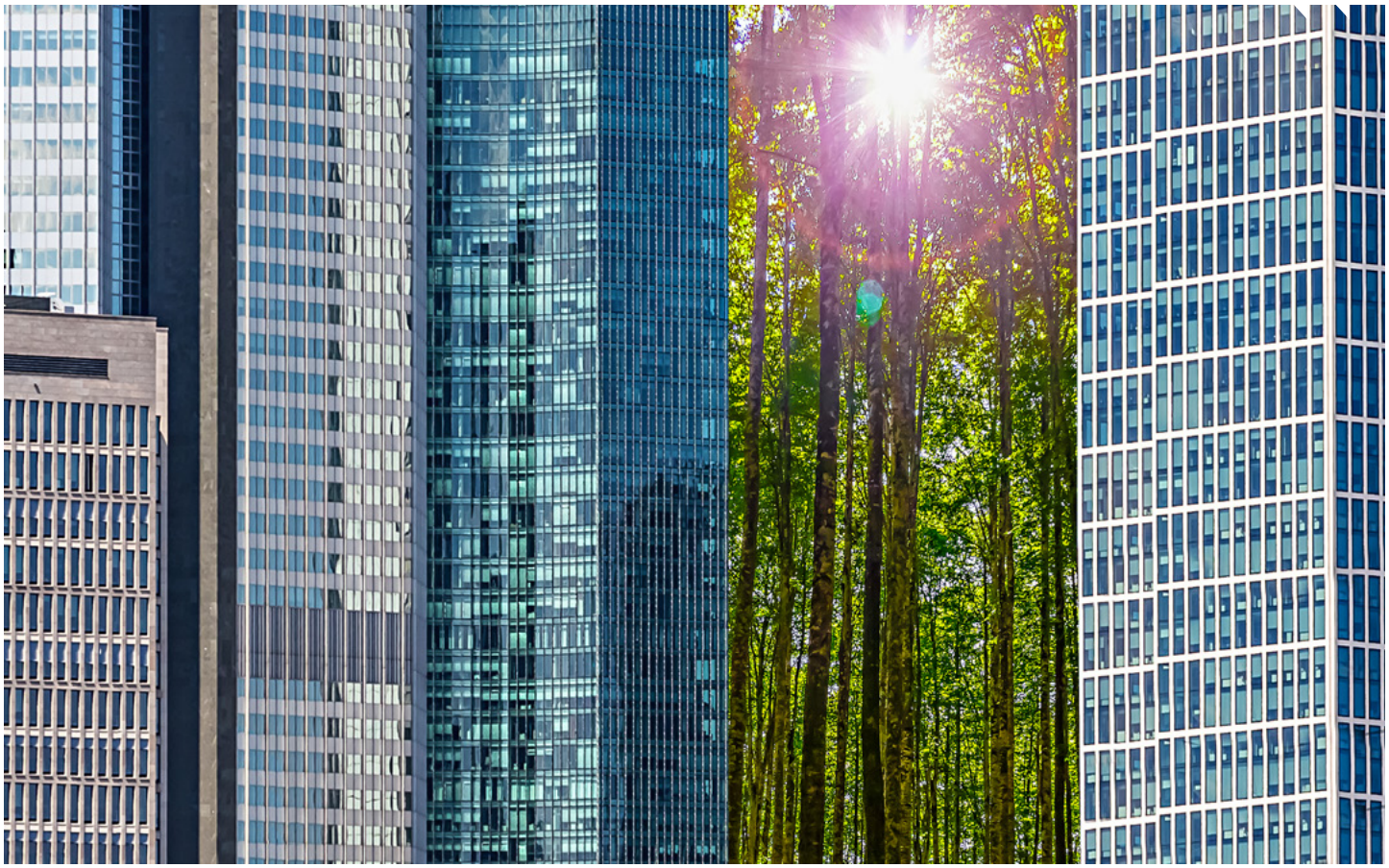


Impact on revenue

Table 6 details the risk clusters identified in the analysis. Clusters are ranked by the minimum level of consensus[vii] between experts on the risk relationships. The revenue impact is the experts' joint estimated impact on the revenue of the sector and, in turn, their ability to meet creditors' repayments.

The scenario each cluster represents has increased the repayment risks once any risk in the cluster is triggered. Fire risk poses the greatest expected impact to revenue. Should this risk cluster occur, the FRC sector can expect revenues to decrease by 24% over 15 months. *Concentration Risk* poses the second greatest impact in revenue with decreased revenue expected to reach 22% over 33 months. Impacted FRC companies may struggle to continue operation and production when these severe and acute risks materialize, leading to default. The risks are not one-off events and could be expected to present ongoing threat scenarios over the medium-to-long term.

These risks may also be triggered should FRC companies adopt damaging shortcuts in their operations to remain solvent. For example, producing lower quality, non-certified or untraceable alternatives which contribute to unsustainable materials entering the market. This is detailed in the description of the Customer Sentiment cluster.



vii. Minimum Consensus Level: depicts the lowest percentage consensus on the existence of a (bi-directional) causation pathway between every risk in a cluster. All other pathways had a higher level than this minimum which measures the weakest linkage.

Table 6 - Top Risk Clusters

Risk cluster	Individual risks	Consensus	Risk description	Revenue impact[viii]	Revenue analysis
 **Political Scenarios**	◥ Pace of Regulation ◥ Political Situation ◥ Rule of Law	48%	Politics, regulation and the rule of law are sometimes not only inconsistent in their intended outcomes but can conflict to produce unintended consequences. This cluster has a high likelihood and significant impact, higher than its constituent risks.	6%	By itself, the risk rating is relatively low compared to the other prominent risk clusters, but all the risks in the cluster have a high influence on other risks.
 **Concentration Risk**	◥ Biodiversity and Concentration ◥ Climate Change ◥ Vulnerability to Pests and Diseases	41%	Monocropping, large plantations and locations at risk to extreme weather and flooding. This scenario has a high likelihood and high severity. It has an increased risk rating due to the inclusion of Climate change.	22%	The high revenue impact combined with the risk type suggests impact and re-establishment costs could be high.
 **Customer Sentiment**	◥ Changing Customer/ Community Attitudes ◥ Ethical & Sustainable Supply Chains ◥ Reputation Issues	37%	Shifting customer and community attitudes with greater interest in ethical and sustainable practices, extending to supply chains. This scenario has major impacts and is likely to almost certain to occur.	8%	The revenue risk is relatively low but still material. The cluster is acute and contains two systemically vulnerable risks meaning it is readily triggered. FIs may come under greater public scrutiny if a lack of due diligence is exposed.
 **Fire Risk**	◥ Biodiversity and Concentration ◥ Climate Change ◥ Fire Risk	36%	The probability of increased and more severe fire seasons impacting FRC concentrations and surrounding native vegetation. This scenario is most severe and almost certain.	24%	The cluster velocity is acute at 16 months and the impact on revenue severe. This cluster scenario has the highest expected loss driven by Climate Change in both severity and event rate. Access to financing may become unobtainable.

viii. Revenue impact = lower bound expected impact on the FRC sector's revenue calculated as: Σ{(severity estimates of the constituent risks within the cluster) X (each constituent risk's Choquet Likelihood)}. The Choquet likelihood is the result of considering the likelihood of a risk being triggered by the risks surrounding it – some of them not included within the cluster.

Influence and vulnerability

Through the expert survey and network analysis, the DRA identifies and ranks both the vulnerable and influential risks in the network. Examining the difference in the rank shows us where to focus attention utilizing network leverage to intervene as efficiently as possible. A summary of ranked influential and vulnerable risks is shown in Table 7.

The higher the rank of the **vulnerable risk** in the right column, the more prone it is to being triggered and influenced by other risks. *Reputation Issues and Financing / Refinancing risks* are the risks with the greatest vulnerabilities.

The higher the rank of the **influential risk** in the left column, the higher its effect throughout the network. *Climate Change* is the top influencer and a key policy target, by mitigating climate risks the greatest mitigation payoff in reducing the network-wide risks is achieved.

The best points for policy makers to intervene to have an overall impact is where the influencer rank is higher than the vulnerable risk rank. As such the optimum mitigation strategy would include targeting:

- **Climate Change**
- **Ethical & Sustainable Supply Chains**
- **Pace of Regulation**
- **Rule of Law**
- **Political Situation**
- **Fire Risk**
- **Transition Pathways**

In addition, vulnerable risks which happen to also appear in the all risk clusters should also be mitigated. These are:

- **Biodiversity and Concentration**
- **Reputation Issues**
- **Changing Customer / Community Attitudes**
- **Vulnerability to Pests and Diseases**

Table 7 - Risks ranked according to influence and vulnerability

Rank	Top Influential Risks	Rank	Top Vulnerable Risks
1	**Climate Change**	1	Reputation Issues
2	**Ethical & Sustainable Supply Chains**	2	Financing / Refinancing
3	**Pace of Regulation**	**3**	**Ethical & Sustainable Supply Chains**
4	Financing / Refinancing	**4**	**Climate Change**
5	**Rule of Law**	5	Fraud, Corruption, Non-Compliance and Improper Practices
6	Fraud, Corruption, Non-Compliance and Improper Practices	6	Changing Customer / Community Attitudes
7	**Political Situation**	7	Inconsistent Industry Governance
8	Inconsistent Industry Governance	8	Biodiversity and Concentration
9	**Fire Risk**	**9**	**Rule of Law**
10	**Transition Pathways**	**10**	**Pace of Regulation**
11	Biodiversity and Concentration	11	Data Availability and Accuracy
12	Reputation Issues	12	Inadequate Due Diligence Procedures
13	Data Availability and Accuracy	**13**	**Political Situation**
14	Inadequate Due Diligence Procedures	**14**	**Fire Risk**
15	FRC Price Volatility	**15**	**Transition Pathways**
16	Nitrogen Runoff & Deterioration of Water Quality	16	FRC Price Volatility
17	Changing Customer / Community Attitudes	17	Vulnerability to Pests and Diseases
18	COVID Consequences	18	Nitrogen Runoff & Deterioration of Water Quality
19	Vulnerability to pests and diseases	19	COVID consequences

CONCLUSION

Policy makers and banks have the means to address forest and climate change risks to accelerate the shift towards sustainable practices within the FRC sector. Banks provide funding to FRC companies and must take a leading role to better understand forest and climate change risks.

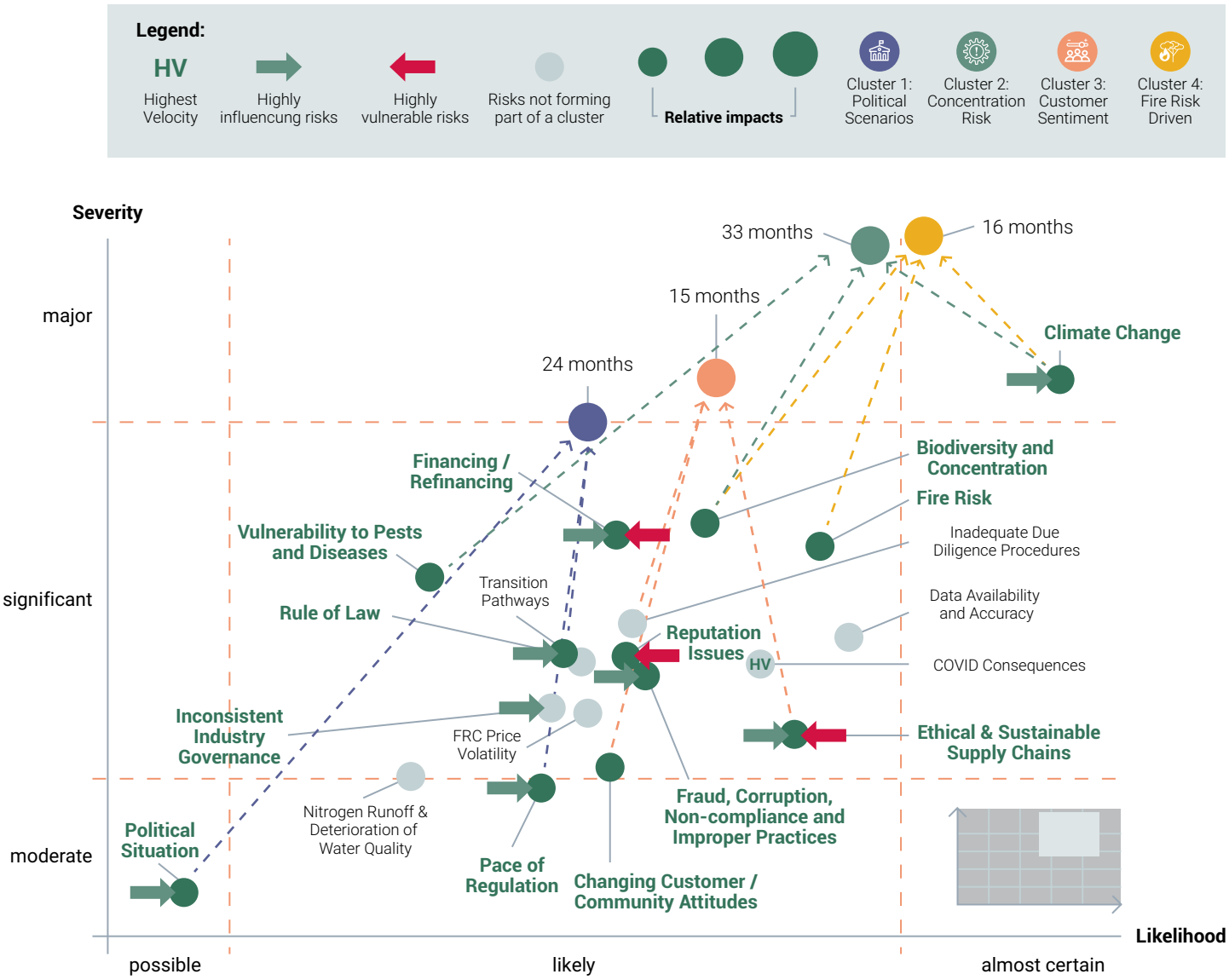
Policy makers should strive to better understand and mitigate systemic risks using policy tools to direct the financial institutions on how this must be done.

This policy brief explored forests and climate change risks, taking a network approach to risk assessment as opposed to a traditional one - bringing deeper, forward-looking insights that are more urgent for the consideration of policy makers and financial institutions involved. Experts identified four risk clusters, which provide significant insights about relationships of the 19 individual risks to truly appreciate their severity and velocity. The clusters provide risk ratings, translating into an expected percentage drop in an FRC company's revenue. This rating provides FIs with a figure that can be used to verify their own assessments of creditworthiness and probability of default and loss given default for FRC borrowers.

Ranking the strength and direction of the risk connections shows the systemic (or network-wide) vulnerability and influence points. These insights enable policy makers to strategize a clear course for effective action. The same insights will also be valuable to FIs to prioritize and manage risks relating to their exposures to deforestation and climate change, for example by aligning lending portfolios to more sustainable forest management practices.

Figure 4 summarizes the complete DRA analysis. It shows how the 19 risks, identified by the experts, are concentrated into four risk clusters – where the risks are expected to rapidly spread to each other and combine when any one of them is triggered. This will produce an aggregate outcome that materially exceeds the severity of each individual risk. It is this aggregate threat level that we invite policy makers and FIs to consider addressing through the recommendations detailed on page 24.

Figure 4 - Summary



POLICY RECOMMENDATIONS

We recommend four immediate actions to support policy makers and regulators to understand and manage forest and climate change risk:

1 Promote meaningful forest and climate change risk disclosures

Improved financial disclosures on climate change and forest risk allows for better decision making, monitoring and assessment of risk by FIs and regulators. Recommended actions include:

- **Adopt recommendations from the Task Force on Climate-related Financial Disclosures' (TCFD)** the TCFD provides a well-recognized basis for the disclosure of climate risks, which is useful for the FRC sector. Regulators in SEA should consider mandating the TCFD recommendations in their sustainable finance actions plans, in line with a growing number of jurisdictions around the world. CDP's information request has been aligned with the TCFD Recommendations since 2018, providing investors and policymakers with high quality, consistent, comparable climate risk data at scale.
- **Promote Science Based Targets[30]**

(SBTs) for GHG emissions reductions it is important to set meaningful climate mitigation targets **within green bonds and ESG risks in taxonomies**, aligned with the latest climate science. SBTs have recently released their financial sector guidance and will soon release a supplement to support forest, land and agriculture target setting for the FRC sector and those financing it.

- **Create policies conducive to increasing the quality and quantity of corporate environmental disclosures** improved disclosures and due diligence practices offer an opportunity to make better data available to stakeholders and to work with customers to improve environmental performance.

2 Ensure forest and climate risks are assessed holistically instead of individually

Policy makers should analyze the systemic (or network-wide) vulnerability and influence points to understand and fully address the dynamic nature of forest and climate change risk. These insights enable policy makers to strategize a clear course for effective action including:

- **Quantify linked risks using financial models** to understand and manage magnified aggregate outcomes. Understand which groups of risks are more likely to happen and will have greater consequence for the forest commodities industry and financial sector when they materialize.
- **Velocity as a risk dimension** velocity provides a timeframe perspective on how rapidly risks will impact the forestry industry once triggered. The velocity gives another useful metric to select interventions to counter short, sharp shocks or more prolonged consequences.

3 Implement policy that mitigates the most influential individual risks

Climate Change, Ethical & Sustainable Supply Chains, Pace of Regulation, Rule of Law, Political Situation, Fire Risk and *Transition Pathways* are identified as key mitigation points. Recommended actions include:

- **Cross-sector collaboration with different ministries at different levels** avoid policy contradictions from overlapping national and state jurisdictions, as well as between different government bodies.

- **Adopt clear commitments and roadmaps towards sustainable finance** implemented at national and sub-national levels. Integrating the financial sector into regional sustainable development plans will be a key element for the Indonesian and Malaysian economies to succeed.

4 Focus on preventing impactful risk clusters from materializing

Bring *Biodiversity and concentration*, *Reputation issues* and *Changing customer/community attitudes* to the top of the agenda for policy makers, regulators and banks. Recommended actions include:

- **Engage with international initiatives** including the Network for Greening the Financial System, the Sustainable Banking Network, the Sustainable Stock Exchanges Initiative, the G7 Initiative on Climate Risk Insurance and the G20 Green Finance Study Group to help leverage international experiences and share best practices to ensure that national regulations are in line with global initiatives.
- **Multi-stakeholder dialogue with the private sector and relevant domestic stakeholders** whilst the Political Scenarios cluster has a relatively low impact on revenue compared to the other prominent risk clusters, it contains risks that have a high influence on other identified risks. Multi-stakeholder dialogue should be enshrined within regulator sustainable finance action plans.
- **Encourage enhanced forest management practices** through enhanced financial due diligence and scrutiny routines, in particular on FRC companies' ownership and control structures and the implementation of NDPE and zero-forest-burning policies and disclosures[ix].

Regulators may also consider how to encourage better forest management practices through the use of grants and subsidies, including the following approaches:

a) Encourage FIs to sign up to the UN Principles for Sustainable Banking, introduce technical regulations, and develop taxonomies and green labels to promote and support the development of sustainable FRCs.

b) Finance certifications (e.g. RSPO) for smallholders and suppliers.

c) Fund independent verification activities, such as sustainability linked loan frameworks, concessions held and ownership to improve credit score, internal- and external rating assessment.

d) Ensure FRC companies and their supply chain respect and adhere to regional and sub-national sustainable development plans.

e) Enhance multi-stakeholder collaboration at jurisdiction level in achieving shared /agreed sustainability goals.

- **Monitoring for risk prevention and impact** in Annex A we provide a data dashboard of possible data sources that can be used to monitor the emergence of individual risks. The indicators may also be useful to track the effectiveness of interventions over time in reducing risks.

ix. Particularly relevant for Indonesia as it has a high level of peat soils.

ANNEX A: DATA DASHBOARD – RISK INDICATORS AND DATA SOURCES

- Publicly available
- Publicly available but requires registration
- Available but requires paid membership

Impact	Individual risks	Suggested indicators	Sources of data
Present and future revenue generation	Changing customer / community attitudes	Exported volumes pr. country of FRC commodity Trending commodity prices	FAOSTAT (Trade Indices) IMF Statistics Data TRASE (Exporters with zero deforestation commitments)
	Inconsistent industry governance	Disclosures on different schemes/ frameworks News trawling	CDP Data (F6.3) NGOs disclosed
	FRC commodity volatility	Changing supply volumes	TRASE (trade volumes) SupplyChain.org
	Ethical & sustainable supply chains	Public commitment to frameworks Increase/Decrease in Certifications	Accountability Framework initiative (Afi) CDP Data (F6.3) RSPO ACOP
	COVID-19 consequences	Deforestation activities Immigration/Transmigration activities	World Bank Geographic Information Systems (GSI) data Global Forest Watch Rainforest Connection
	Vulnerability to pests and diseases	Yield prediction Changes in crop Inventory	FAOSTAT (Crops Processed)
	Nitrogen runoff & deterioration of water quality	Changes in fertilizer amounts over a period of time	FAOSTAT (Fertilizer by Product and Pesticide Indicator) Remote sensing (RS) and Geographic Information Systems (GIS)
	Climate change	Volume of precipitation Insurance claims catastrophe losses Carbon pricing initiatives	CDP Data (data on physical deforestation risks facing companies can be found in F3.1b) Claims stat (e.g. https://www.sigma-explorer.com) Hazard maps FAOSTAT (Temperature Change) World Bank (Climate Change Knowledge Portal) World Bank (Carbon pricing dashboard)
	Fire Risk	Temperature increase Company disclosures on preventive measures Volume of precipitation	Haze Diagnostic Kit Eyes on the Forest, Global Forest Watch RSPO criteria/requirements

Publicly available

Publicly available but requires registration

Available but requires paid membership

Impact	Individual risks	Suggested indicators	Sources of data
	Biodiversity and concentration	Crop inventory Land use concessions	CERES SPOTT / High conservation value (HCV) and high carbon stock (HCS) management FAOSTAT (Production) National registers/maps
Impact on Regulatory trajectory and expectations	Political situation	Frequent changes of regulations	World Bank governance indicators
	Pace of regulation	Fines & negative news trawling External ratings & scores	CDP score MSCI, Sustainalytics, EcoVadis, SPOTT, RSPO and FSC
	Transition pathways	Livelihood of smallholders Investments increase/decrease	FAOSTAT (Investment) FPIC report
Impact on reputation	Reputation issues	News trawling	NGOs reports Media screening
	Financing / refinancing	Changes in NPL Outstanding loans Over/under-subscription on debt/equity deals coming to market	Annual reports NPL performance information from OJK Credit ratings (e.g. Moodys, Fitch, S&P etc) Worldbank/ IFC report
	Data availability and accuracy	Disclosures / Sustainability report published	SPOTT scores on transparency Response rates to CDP request Global canopy WWF scorecard
	Fraud, corruption, non-compliance and improper practices	Exclusions from certifications (e.g. RSPO, FSC) Reports & Publications	GNPSDA (KPK report) NGOs report (Auriga, Koalisi Anti-Mafia Hutan, Eyes on the Forest, WWF)
	Inadequate Due Diligence procedures	Complex ownership structures Draught tracking	CDP FS Pilot Questionnaire (data on due diligence processes can be found in FS2.3) Publicly available policy statements TRASE
	Rule of Law	Disputes	NGOs (social) report, e.g. Walhi, FWI, Sawit watch, Greenpeace Worldbank

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CDP is a global non-profit that runs the world's environmental disclosure system for companies, cities, states and regions. Founded in 2000 and working with more than 590 investors with over $110 trillion in assets, CDP pioneered using capital markets and corporate procurement to motivate companies to disclose their environmental impacts, and to reduce greenhouse gas emissions, safeguard water resources and protect forests. Over 10,000 organizations around the world disclosed data through CDP in 2021, including more than 9,600 companies worth over 50% of global market capitalization, and over 940 cities, states and regions, representing a combined population of over 2.6 billion. Fully TCFD aligned, CDP holds the largest environmental database in the world, and CDP scores are widely used to drive investment and procurement decisions towards a zero carbon, sustainable and resilient economy. CDP is a founding member of the Science Based Targets initiative, We Mean Business Coalition, The Investor Agenda and the Net Zero Asset Managers initiative.

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