Lesson 4.2

Climate and Nature Risk Frameworks

TCFD and TNFD for Risk Assessment

Module 4: Green Finance Risk Management

GREEN FINANCE Professional Certificate

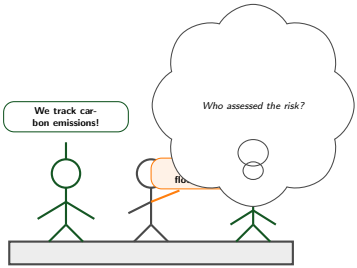
Erasmus+ CBHE 101237817

Why Did a Green-Aware Bank Still Miss the Risk?

[FOUNDATION]

Situation: A bank publishes a 120-page ESG report tracking carbon emissions, water usage, and diversity metrics.
Complication: A $200M flood loss hits a coastal loan portfolio. The board asks: "Who was assessing the actual risk?"
Question: What is the gap between *disclosing* climate data and *managing* climate risk?

- Banks with ESG reports still suffered unexpected climate losses
- Tracking emissions is **not** the same as assessing risk
- Frameworks bridge the gap between awareness and action



Tracking emissions is not the same as managing risk.

This is the gap TCFD and TNFD fill – moving from disclosure to risk management.

What Is the Difference Between Knowing and Managing?

[FOUNDATION]

Knowing the Risk (Lesson 4.1)

- Physical / transition / liability **classification**
- Risk heatmaps by sector and geography
- Transmission channels identified (credit, market, operational, liquidity)
- Double materiality awareness

"We know that our coastal loan portfolio faces physical risk from flooding and our fossil fuel exposure faces transition risk from carbon pricing."

Managing the Risk (Lesson 4.2)

- **Governance** processes for board oversight
- **Risk identification** protocols documented
- **Assessment** methodologies with severity and likelihood scoring
- **Integration** into Enterprise Risk Management (ERM)

"We have a documented process to identify, score, escalate, and mitigate these risks through our existing risk governance."

Key Insight

Lesson 4.1 gave you the **vocabulary**. Lesson 4.2 gives you the **operating system**.

TCFD was created because risk classification alone did not change institutional behavior.

Road Map: From Risk Awareness to Risk Assessment Frameworks

Section	Slides	Central Question
Introduction	1–4	Why do we need frameworks?
Context	5–9	Where did TCFD come from?
Challenge	10–15	What are the four TCFD pillars?
Analysis	16–24	How do TNFD and Basel fit in?
Resolution	25–30	How does Thailand implement this?
Summary	31–33	What should you remember?

The lesson follows a **case-based** arc: we open with a real institution failing to manage climate risk despite awareness, show why frameworks are needed, walk through TCFD pillars and TNFD LEAP as analytical tools, and resolve with the Thai bank worked example and ASEAN regulatory comparison.

Lesson 4.2 of 6 in Module 4. Foundation level with Intermediate and PhD extensions.

Why Did the G20 Ask for a Climate Risk Framework?

[FOUNDATION]

Timeline of Climate-Finance Wake-Up Calls

- **2008:** Financial crisis reveals systemic blind spots – risk frameworks missed correlated exposures
- **2015:** Mark Carney's "tragedy of the horizon" speech at Lloyd's of London
- **2015:** G20 asks the Financial Stability Board (FSB) to create a task force on climate risk
- **2017:** TCFD publishes its first recommendations

The Problem Statement

- Financial institutions had **no standardized way** to identify, assess, and manage climate-related risks
- Each bank did it differently – or **not at all**
- Climate risk was buried in CSR reports, invisible to investors and regulators
- No comparability across institutions or jurisdictions

Key Insight

Climate risk was invisible to financial markets – not because it did not exist, but because **no one was systematically looking**.

The FSB created TCFD in 2015 because climate risk was invisible to financial markets – not because it didn't exist, but because no one was systematically looking.

What Does TCFD Actually Recommend?

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Mission: Create a consistent, comparable framework for climate risk assessment across financial institutions.

Pillar	Disclosures	Focus
Governance	2	Board oversight of climate risks; management's role in assessing and managing
Strategy	3	Climate risks/opportunities identified; impact on business, strategy, financial planning; scenario analysis
Risk Management	3	Processes for **identifying**, **assessing**, and **managing** climate-related risks; integration into overall risk management
Metrics & Targets	3	Metrics used to assess climate risks; Scope 1/2/3 GHG emissions; targets and performance
Total	**11**	

Key Distinction

TCFD is **not just a reporting standard**. The Risk Management pillar is about **internal processes** – how the institution identifies, assesses, and manages climate risks – not external disclosure.

The 11 TCFD recommendations span both internal processes (Risk Management pillar) and external communication. This lesson focuses on the internal.

What Is Our Scope? Risk Management, Not Reporting

[FOUNDATION]

Module 4 vs Module 5 Boundary

Module 4 = Risk assessment and management

- **Identify** climate-related risks
- **Measure** their severity and likelihood
- **Manage** through mitigation, transfer, or acceptance

Module 5 = Reporting and disclosure

- **Communicate** risk assessments to stakeholders
- **Comply** with regulatory reporting requirements

Example: The Same Risk, Two Modules

Module 4 (this lesson):
"Identify flood risk in the loan portfolio, score its severity at 4/5, assess transmission through credit channel, integrate into the ERM risk register."

Module 5 (future):
"Report flood risk exposure in the annual sustainability report per ISSB S2 requirements."

Key Insight

TCFD's Risk Management pillar is where risk management **lives**. The other three pillars support or communicate it.

This scope boundary means we teach TCFD as a risk MANAGEMENT tool here. Reporting compliance is Module 5.

How Does TCFD Compare to What Came Before?

[FOUNDATION]

Before TCFD

- Ad hoc climate risk assessment – no standard process
- No common vocabulary across institutions
- No comparability for investors or regulators
- Climate risk buried in CSR reports, disconnected from financial risk management

After TCFD

- Standardized four-pillar framework with 11 recommendations
- Documented processes for risk identification and assessment
- Scenario analysis **required** (not optional)
- Comparable metrics across institutions and jurisdictions

Dimension	Before TCFD	After TCFD
Scope	Voluntary, narrow	Comprehensive, four pillars
Process	Undefined	Identify → Assess → Manage
Comparability	None	Standardized metrics
Integration	Separate from finance	Embedded in ERM

Before TCFD, climate risk was treated as a sustainability issue. After TCFD, it became a financial risk management issue.

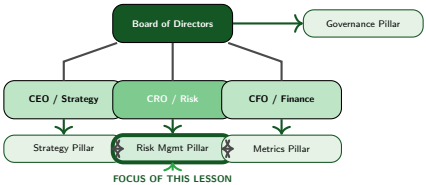
What Does TCFD Look Like Inside a Bank?

[FOUNDATION]

Mapping TCFD to Organizational Structure

- **Board of Directors** → Governance pillar (oversight, risk appetite)
- **CEO / Strategy team** → Strategy pillar (business impact, planning)
- **CRO / Risk function** → Risk Management pillar (identify, assess, manage)
- **CFO / Finance** → Metrics & Targets pillar (quantify exposure, track progress)

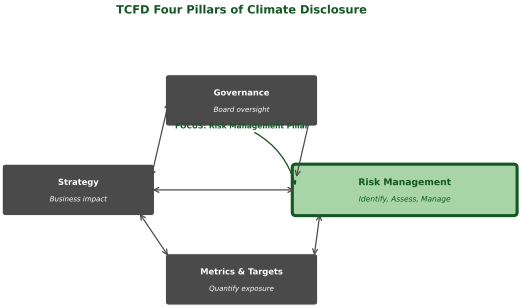
Key: TCFD implementation requires coordination across the **entire C-suite**, not just the sustainability department.



In practice, TCFD implementation requires coordination across the entire C-suite, not just the sustainability department.

How Do the Four TCFD Pillars Work Together?

[FOUNDATION]



- The four pillars are **interconnected**, not independent – Risk Management feeds Strategy with risk assessments
- Governance sets direction; Risk Management identifies threats; Strategy responds; Metrics tracks progress
- The Risk Management pillar is **highlighted** because it is the operational core of the framework

The four pillars form a cycle: Governance sets direction, Risk Management identifies threats, Strategy responds, Metrics tracks progress.

What Does the Risk Management Pillar Actually Require?

[FOUNDATION]

Three TCFD Sub-Recommendations

(a) Processes for identifying climate-related risks

- What risks to scan for
- Horizon analysis (short, medium, long)
- Sector and geography screening

(b) Processes for assessing climate-related risks

- Severity scoring (1–5 scale)
- Likelihood estimation
- Time horizon classification
- Transmission channel mapping

(c) Processes for managing climate-related risks

- Mitigation actions defined
- Risk transfer (insurance, hedging)
- Acceptance decisions documented

What Each Step Means in Practice

Step	Practical Output
(a) Identify	List of all material climate risks, screened by sector, geography, and horizon
(b) Assess	Risk register entries with severity, likelihood, and channel scores
(c) Manage	Documented mitigation plan per risk, with owner, timeline, and budget

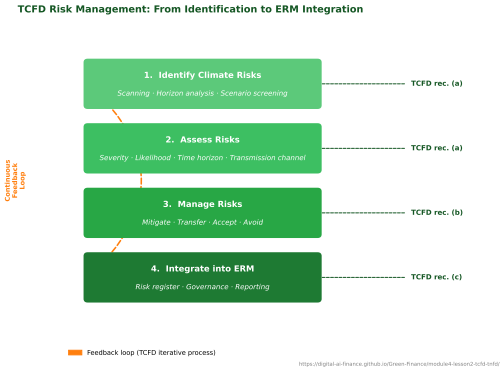
Key Insight

Each sub-recommendation requires **documented processes**, not just awareness. "We know about flood risk" is not sufficient – "We score flood risk at 4/5 severity and have a mitigation plan" is.

The Risk Management pillar has three sub-recommendations: Identify, Assess, Manage. Each requires documented processes, not just awareness.

How Do You Embed Climate Risk Into Existing Risk Frameworks?

[FOUNDATION]



- Climate risk flows through the same **identify** → **assess** → **manage** → **integrate** process as any other risk
- ERM integration means climate risk is **not a separate silo** but embedded into existing governance, escalation, and reporting channels
- The feedback loop from integration back to identification ensures the process is **continuous**, not a one-off exercise

ERM integration means climate risk uses the same governance, escalation, and reporting channels as credit risk or market risk – not a separate track.

What Does ERM Integration Look Like in Practice?

[INTERMEDIATE]

ERM Integration Principles

1. **Same risk appetite statement** covers climate – not a separate appetite
2. **Same risk register** includes climate entries alongside credit, market, and operational risks
3. **Same committee structure** reviews climate risks – ALCO, credit committee, risk committee
4. **Same reporting cadence** applies – quarterly risk reports include climate section

Worked Example: Risk Register Entry

A bank adds a new entry to its **existing** credit risk register:

Field	Value
Risk	Physical flood risk to mortgage portfolio
Category	Credit risk – collateral impairment
Likelihood	Medium (score 3/5)
Severity	High (score 4/5)
Time horizon	5–10 years
Owner	Chief Risk Officer
Mitigation	Require flood insurance on coastal collateral

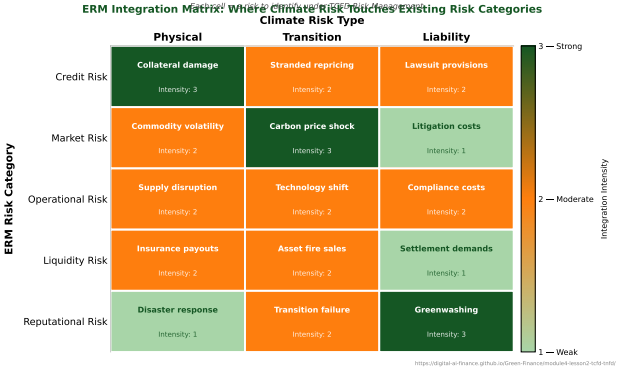
Key Insight

Integration means adding climate **rows** to existing risk tables, not building new tables.

Intermediate: The hardest part of ERM integration is organizational, not technical – getting risk committees to treat climate risk as 'real' risk.

Where Does Climate Risk Touch Every Part of the Risk Framework?

[INTERMEDIATE]



- Every cell in this matrix is a potential risk that the TCFD Risk Management pillar requires the institution to **identify and assess**
- Credit risk has the strongest linkages across all three climate risk types (physical, transition, liability)
- Reputational and liability risks interact: greenwashing exposure creates both legal and reputational consequences

Intermediate: Every cell in this matrix is a potential risk that the TCFD Risk Management pillar requires the institution to identify and assess.

Can You Walk Through a TCFD Risk Identification for a Thai Bank?

[INTERMEDIATE]

Step-by-Step Identification

Step 1: List all physical risks for Thailand

- Flood (riverine and coastal)
- Drought (Mekong basin, agricultural)
- Sea-level rise (Bangkok, Gulf coast)

Step 2: List all transition risks

- Carbon tax (under consideration)
- Renewable energy policy (solar incentives)
- Stranded coal assets (coal phase-out timeline)

Step 3: Map each to transmission channel

- Flood → credit risk (collateral), operational risk
- Carbon tax → market risk (repricing)
- Coal stranding → credit risk (default)

Completed Risk Register

Risk	Channel	Sev.	Horizon
Flood	Credit	4	Short
Drought	Credit	3	Medium
Sea-level	Credit	4	Long
Carbon tax	Market	2	Medium
Solar policy	Market	2	Medium
Coal strand.	Credit	3	Long

Severity scale: 1 = negligible, 2 = low, 3 = moderate, 4 = high, 5 = severe.
Horizon: Short = 1–3yr, Medium = 3–10yr, Long = 10–30yr.

Note

This worked example mirrors the Quantitative Lab exercise. Students replicate it for 10 ASEAN institutions.

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Why Do We Need a Separate Framework for Nature Risk?

[FOUNDATION]

Nature Risk Goes Beyond Climate

- **Deforestation:** loss of carbon sinks and biodiversity
- **Water stress:** depleted aquifers, contaminated rivers
- **Pollinator loss:** agricultural yield collapse
- **Soil degradation:** reduced productivity, desertification
- **Ocean acidification:** fisheries collapse

These affect financial returns through supply chain disruption, regulatory action, and asset impairment – just like climate risk, but with **different drivers and different data needs**.

The Scale of Nature Dependency

- **$44 trillion** of economic value generation (>50% of global GDP) is moderately or highly dependent on nature (WEF, 2020)
- ASEAN is one of the world's most biodiversity-rich regions
- Palm oil, fisheries, and tourism are nature-dependent pillars of ASEAN economies

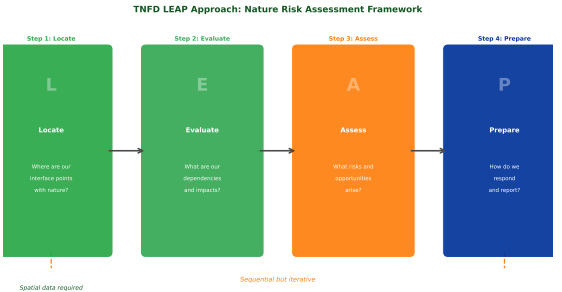
TNFD

The Taskforce on Nature-related Financial Disclosures (TNFD) was created in 2021 to complement TCFD – extending the framework from climate to the broader natural world.

TCFD covers climate. TNFD extends the framework to the broader natural world – biodiversity, water, land, ocean.

How Does TNFD's LEAP Approach Work?

[FOUNDATION]



- **L**ocate: Where are our assets relative to sensitive biomes? (Requires **spatial/GIS data**)
- **E**valuate: What are our dependencies and impacts on nature?
- **A**ssess: What nature-related risks and opportunities arise?
- **P**repare: How do we respond and what do we report?

LEAP is sequential but iterative – each assessment cycle refines the previous one as spatial data and dependency mapping improve.

What Does "Locate" Mean in Practice?

[FOUNDATION]

LEAP Step 1: Locate

Definition: Map physical assets, operations, and supply chains against:

- Sensitive biomes and ecosystems
- Protected areas (national parks, reserves)
- Water-stressed regions
- Deforestation frontiers
- Key biodiversity areas

Requires: Geographic Information Systems (GIS), spatial databases, and supply chain mapping tools.

Example: Palm Oil Lending in Borneo

A regional bank maps its palm oil borrowers' plantation locations against deforestation frontiers.

Finding	Result
Total financed plantations	45
Overlap with high-biodiversity	23%
Overlap with protected areas	8%
Within deforestation frontier	31%

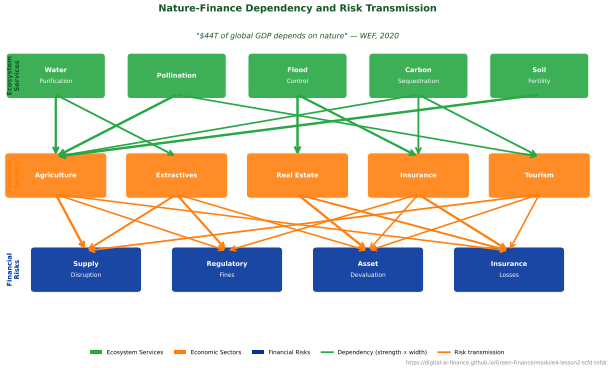
Key Insight

You cannot assess nature risk if you do not know **where** your exposures are. The "Locate" step is what makes TNFD fundamentally **spatial**.

The 'Locate' step is what makes TNFD fundamentally spatial. Climate risk can be assessed sector-by-sector; nature risk requires geography.

How Does Nature Become a Financial Risk?

[FOUNDATION]



- Nature dependencies are often **invisible until disrupted** – pollination, water purification, and flood control are taken for granted
- Agriculture is the most nature-dependent sector; water stress affects 40% of global thermal power generation
- The nature-finance link is analogous to the climate-finance link from L4.1, but **spatially explicit** and ecologically complex

The nature-finance link is analogous to the climate-finance link from L4.1, but spatially explicit and ecologically complex.

How Do TNFD Sector Guides Differ by Industry?

[INTERMEDIATE]

Financial Institutions

- Portfolio-level nature dependency screening
- Financed deforestation metrics
- Spatial risk overlays on loan books
- ASEAN: Thai bank palm oil exposure mapping

Agriculture

- Land-use change monitoring
- Water consumption intensity
- Pollinator dependency assessment
- Soil health indicators
- ASEAN: Vietnam Mekong Delta rice

Extractives

- Biodiversity offset requirements
- Tailings dam environmental risk
- Water pollution metrics
- Mine site rehabilitation costs
- ASEAN: Philippine mining in Mindanao

Key Insight

TNFD sector guidance recognizes that nature risk differs fundamentally by industry – a bank and a palm oil company face very different nature risks, requiring different assessment methods and metrics.

Intermediate: TNFD sector guidance recognizes that nature risk differs fundamentally by industry – a bank and a palm oil company face very different nature risks.

What Does Scenario Analysis Look Like Under TCFD Risk Management?

[INTERMEDIATE]

TCFD Requires Scenario Analysis

TCFD mandates scenario analysis as part of risk assessment – not just disclosure. Two types required:

1. **Transition scenarios:** Policy pathways, technology shifts, market evolution
2. **Physical scenarios:** Warming trajectories ($\leq 2^{\circ}$C, $>2^{\circ}$C), sea-level rise, extreme weather frequency

Minimum requirement: At least one 2°C scenario and one $>2^{\circ}$C scenario.

How Scenarios Feed Risk Management

Scenario outputs become **inputs** to the Risk Management pillar:

- GDP impact projections $\rightarrow$ credit risk adjustment
- Sector-level shocks $\rightarrow$ portfolio concentration assessment
- Physical damage projections $\rightarrow$ collateral revaluation
- Policy pathways $\rightarrow$ transition risk identification

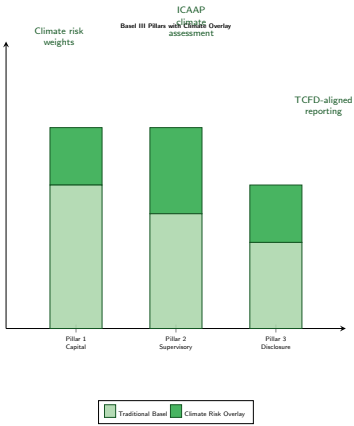
Scope Note

Lesson 4.3 covers scenario modeling in depth (NGFS pathways, IAMs). Here we focus on **how TCFD frames the requirement** – the "what" not the "how."

Intermediate: TCFD requires scenario analysis for risk ASSESSMENT. How to actually run scenarios is Lesson 4.3.

How Does Climate Risk Fit Into Basel III/IV?

[INTERMEDIATE]



Climate Integration by Pillar

Pillar 1 – Capital:

- Climate adjustments to risk weights for high-exposure sectors
- Potential "green supporting factor" for sustainable lending

Pillar 2 – Supervisory Review:

- ICAAP must assess climate as a material risk
- Supervisory stress testing expectations
- TCFD Risk Management pillar maps directly here

Pillar 3 – Disclosure:

- TCFD-aligned climate risk reporting
- Comparable metrics across jurisdictions

Intermediate: Basel integration means climate risk affects capital requirements (P1), supervisory assessment (P2), and disclosure (P3) simultaneously.

Why Is Pillar 2 the Bridge Between TCFD and Regulation?

[INTERMEDIATE]

Pillar 2 and ICAAP

The Internal Capital Adequacy Assessment Process (ICAAP) requires banks to assess **all material risks** – including climate.

TCFD Risk Management pillar maps directly to ICAAP:

- Identify → ICAAP risk identification
- Assess → ICAAP materiality assessment
- Manage → ICAAP capital planning

Supervisors use TCFD alignment to evaluate whether banks adequately assess climate risk in their ICAAP submissions.

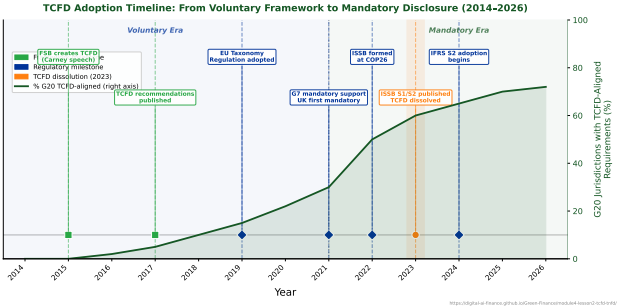
Supervisory Expectations

Authority	Climate Risk Guidance
BCBS	Principles for climate risk management (2022) – 18 principles for banks
ECB	Guide on climate and environmental risks (2020) – 13 supervisory expectations
BOT	Sustainable Finance Framework (2023) – TCFD-aligned requirements
MAS	Environmental Risk Management Guidelines (2022) – mandatory for banks

Pillar 2 is where TCFD becomes regulatory. Supervisors use TCFD alignment to evaluate whether banks adequately assess climate risk.

How Has the Regulatory Landscape Shifted from Voluntary to Mandatory?

[PhD]



- The shift from voluntary TCFD to mandatory ISSB S2 took only **8 years** – one of the fastest voluntary-to-mandatory transitions in financial regulation
- The 2023 dissolution of TCFD into ISSB marked the transition from "best practice" to "baseline standard"
- ASEAN adoption is accelerating: Singapore leads, Thailand is developing, Vietnam is nascent

PhD: The shift from voluntary TCFD to mandatory ISSB S2 took only 8 years – one of the fastest voluntary-to-mandatory transitions in financial regulation.

Do Institutional Investors Actually Act on Climate Risk Frameworks?

[PhD]

Evidence FOR Action (+)

Krueger, Sautner & Starks (2020) survey institutional investors:

- Institutional investors **do** consider climate risk in investment decisions
- Large investors engage on climate **more** than small ones
- Climate risk awareness correlates with ESG integration practices
- **43%** consider climate risks "important" or "very important"

Evidence AGAINST Action (−)

The same study reveals a gap:

- Awareness does **not** equal action – many acknowledge risks but do not adjust portfolios
- Only **25%** had actually adjusted portfolio allocation based on climate risk
- Free-rider problem in engagement: each investor hopes others will act
- Short-term performance pressure overrides long-term risk assessment

The Awareness-Action Gap

43% consider climate risks important, but only 25% had adjusted allocation. **Awareness exceeds action by nearly 2:1.**

PhD: Krueger et al. (2020) showed that 43% of institutional investors consider climate risks important but only 25% had adjusted portfolio allocation – awareness exceeds action.

Case Study: How Did Thailand Implement TCFD for Its Banks?

[FOUNDATION]

Bank of Thailand (BOT) Mandate

BOT's Sustainable Finance Framework (2023) requires all commercial banks to adopt TCFD-aligned climate risk assessment:

Requirements:

1. Integrate climate risk into ERM frameworks
2. Conduct scenario analysis under TCFD guidance
3. Report TCFD-aligned disclosures to BOT

Phased Approach:

- **Phase 1 (2024):** Large commercial banks (assets $>$ THB 5 trillion)
- **Phase 2 (2025):** All registered commercial banks

Why Thailand Acts

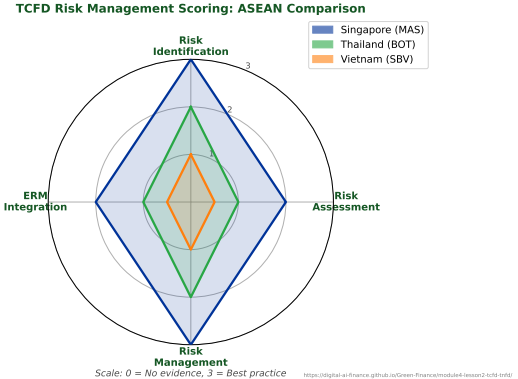
Motivator	Data
2011 flood damages	$46.5 billion
Agriculture share of GDP	10%
Coastal population	26 million
Bangkok subsidence	1–2 cm/year
Climate loss (annual)	$8B+ projected

Thailand's 2011 floods were a powerful motivator – the world's fourth-costliest natural disaster at the time.

ASEAN Case Study: Thailand's approach to TCFD implementation is the most advanced among ASEAN developing economies.

How Well Do ASEAN Banks Score on TCFD Risk Management?

[INTERMEDIATE]

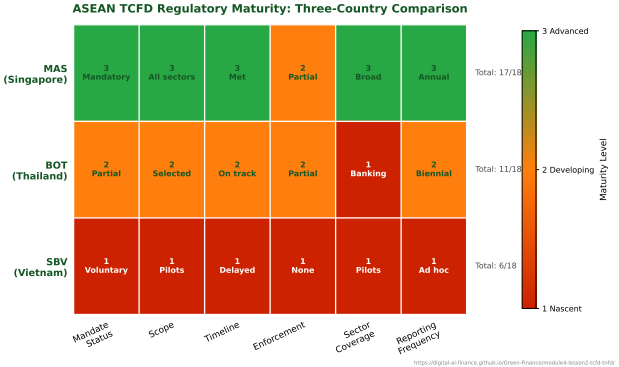


- MAS-regulated institutions (Singapore) score highest across all four TCFD Risk Management dimensions
- Vietnamese institutions score lowest on **ERM integration** – climate risk acknowledged but not embedded in risk registers
- Insurers tend to outperform banks on **risk identification** due to longer experience with catastrophe modeling

Quantitative Lab: Students build this radar chart by scoring TCFD disclosures for 10 ASEAN institutions using a standardized rubric.

How Do Thailand, Singapore, and Vietnam Compare?

[INTERMEDIATE]



- Singapore (MAS) leads on mandate maturity with **mandatory, comprehensive** guidelines since 2022
- Thailand (BOT) is the most advanced among **developing** ASEAN economies with a clear phased timeline
- Vietnam (SBV) is in the earliest stages – voluntary guidance with limited enforcement

Singapore leads on mandate maturity. Thailand is the most advanced among developing ASEAN economies. Vietnam is in the earliest stages.

Worked Example: Score a Thai Bank's TCFD Risk Management

[INTERMEDIATE]

Scoring Rubric (0–3 per dimension)

Dimension	Score	Evidence
Identification	2/3	Climate risk scanning process documented but not comprehensive
Assessment	1/3	Severity mentioned but no systematic scoring
Management	2/3	Mitigation actions for flood risk defined; transition risk gaps
Integration	1/3	Climate mentioned in risk report but not in ERM register

Aggregated Score and Interpretation

Metric	Value
Total score	6 / 12
Rating	Developing
MAS benchmark	9 / 12
Gap to benchmark	−3 points

Gap Analysis:

- **Weakest:** Assessment (1/3) and Integration (1/3)
- **Strongest:** Identification (2/3) and Management (2/3)
- **Priority:** Implement systematic severity scoring and add climate rows to ERM risk register

Method

This rubric-based scoring is the methodology students use in the Quantitative Lab for all 10 ASEAN institutions.

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What Are the Key Gaps in ASEAN TCFD Implementation?

[FOUNDATION] [INTERMEDIATE]

Four Implementation Gaps

1. **Data availability:** ASEAN firms provide limited Scope 1/2 data, forcing Tier 4–5 estimates with wide uncertainty bands
2. **Scenario analysis capacity:** Few ASEAN banks can run climate scenarios internally – most rely on external consultants

Four Implementation Gaps (cont.)

3. **Nature risk blind spot:** TNFD adoption is near zero in ASEAN despite high nature dependency (palm oil, fisheries, tourism)
4. **Integration gap:** Climate risk is acknowledged in sustainability reports but **not embedded** in ERM processes, risk registers, or capital planning

What Would Close These Gaps?

- Mandatory Scope 1/2 reporting for listed firms
- Central bank scenario analysis toolkits
- TNFD pilot programs for nature-dependent sectors
- Supervisory assessment of ERM integration

These four gaps define the implementation frontier for ASEAN climate risk management over the next 5 years.

Seven Things You Now Know About Climate Risk Frameworks

[FOUNDATION]

Seven Key Concepts

1. TCFD has **four pillars**: Governance, Strategy, Risk Management, Metrics & Targets
2. The **Risk Management pillar** is the operational core: identify, assess, manage
3. **ERM integration** means climate risk uses existing governance channels
4. TNFD extends frameworks to **nature risk** via the LEAP approach
5. Nature-finance **dependencies** are often invisible until disrupted
6. Basel III/IV **integrates** climate risk into capital, supervisory, and disclosure requirements
7. The TCFD-to-ISSB **evolution** moved climate risk from voluntary to mandatory

Where This Leads

Lesson	Builds On
4.3	*Scenario analysis*: building the scenarios TCFD requires
4.4	*Carbon metrics*: measuring what the frameworks identify
4.5	*Stress testing*: quantifying the risks under scenarios
4.6	*Data & tech*: tools for implementation at scale

Five questions to assess any institution's TCFD Risk Management maturity:

1. Is there a documented climate risk scanning process?
2. Are risks scored by severity and time horizon?
3. Are mitigation actions defined with owners?
4. Is climate risk in the ERM register?
5. Is integration reviewed by the risk committee?

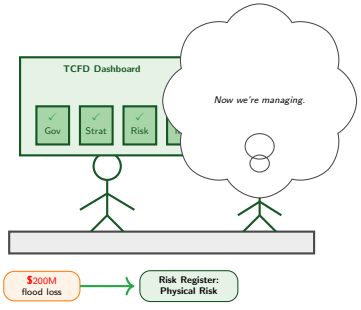
Lesson 4.2 complete. Next: Lesson 4.3 – Scenario Analysis and Climate Modeling (NGFS pathways to IAMs).

The CRO Who Learned to See the Whole Picture

The Pedagogical Arc

- We began with a CRO who tracked emissions but missed a $200M flood loss – **no framework, no process**
- We end with the same CRO equipped with TCFD pillars, TNFD LEAP, ERM integration, and a scoring rubric

Remember: Frameworks do not eliminate risk. They provide the **systematic process** to identify, assess, and manage it – turning awareness into institutional action.



Original illustration. The pedagogical arc of Lesson 4.2: from 'We know about climate risk' to 'We systematically assess and manage it.'

Key References

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All references are open-access or available through university libraries.