

A Guide to Flood Risk Assessments for Enhanced TCFD Disclosures

About this Guide – Sharing Japan's Experience as a Common Reference

This guide proposes a practical method for evaluating flood risks for companies, in line with the Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). It utilizes the latest knowledge and data available for assessing flood risks. The guide is unique because it includes (1) a method that is consistent with a hydraulic engineering perspective, (2) information that practitioners who are unfamiliar with flood risk assessment can manipulate easily, and (3) countermeasures to deal with flood risks.

The Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) proposes this guide to aid companies in disclosing flood risks, given that about 28% (1,199) of companies declaring support for the TCFD recommendations as of January 2023 are from Japan. Japan, located in the monsoon region of Asia with high rainfall, has been prone to flooding historically. However, Japan has been able to mitigate flood damage by developing flood protection infrastructures, making it one of the countries with sophisticated flood-related disaster preparedness and expertise in flood risk assessment.

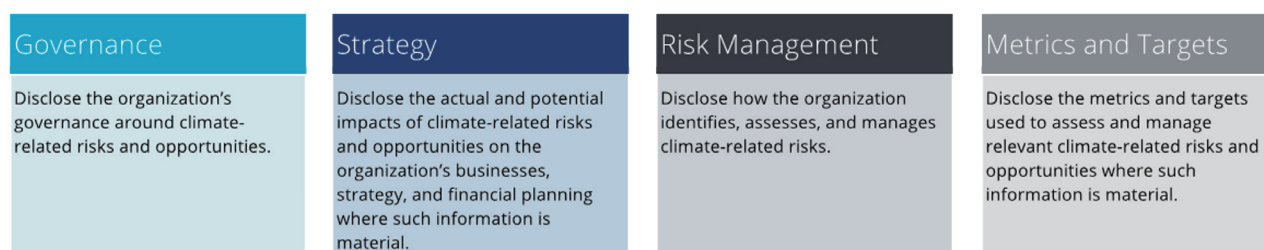
It has been suggested that assessing river flood risk is more challenging than assessing other climate-related physical risks as it requires specialized knowledge¹. Since few existing guides are available to support disclosure related to flood risks, this guide introduces currently-available methods and datasets appropriate for risk disclosure and will serve as a reference for flood risk assessment in Japan and other countries. Furthermore, the guide will help companies assess and disclose physical risks, thereby ensuring transparency in risk management and enabling investors to have greater access to consistent, comparable, reliable, and understandable corporate risk information.

TCFD Recommendations and Climate-Related Physical Risks

Climate change is expected to significantly increase catastrophic climate-related events such as floods and droughts worldwide. In 2017, TCFD released its final report, which presented a framework for companies to disclose climate-related risks and opportunities at the request of G20 finance ministers and central bank governors. The recommendations are structured around four core elements of organizations' operations: governance, strategy, risk management, and metrics and targets (Figure 1).

Since the release of the recommendations, various countries have been working on making the disclosure of climate-related information mandatory. For example, companies listed on the London Stock Exchange's Premium Segment are required to disclose information based on the recommendations, and those listed on Tokyo Stock Exchange's Prime Market are asked to enhance the quality and quantity of disclosed information based on the TCFD recommendations or an equivalent framework. Furthermore, the Financial Services Agency in Japan has created a new section for sustainability-related information in Annual Securities Reports.

Disclosing information based on the TCFD recommendations may bring medium- to long-term benefits to companies. According to the Ministry of the Environment's "Overview for the TCFD," proper assessment and management of climate-related risks may earn trust from investors and lenders, which, in turn, could lead to increased investment by financial institutions.



Source: Final Report Recommendations of the Task Force on Climate-related Financial Disclosures (2017)

Figure 1 Recommendations and Supporting Recommended Disclosures

¹ Assessing flood risks requires (1) analyzing the process from heavy rainfall to flood occurrence and (2) inundation depth and flood protection at each location, which cannot be done only with climate model datasets such as CMIP6.

Table 1 Examples of Climate-Related Risks and Potential Financial Impacts

Type	Climate risks	Potential Financial Impacts
Transition	Policy and Legal Technology Market Reputation	
Physical	Acute Increased severity of extreme weather events such as cyclones and floods	<ul style="list-style-type: none"> - Reduced revenue from decreased production capacity (e.g., transport difficulties, supply chain interruptions) - Write-offs and early retirement of existing assets (e.g., damage to property and assets in "high-risk" locations) - Increased capital costs (e.g., damage to facilities) - Increased insurance premiums and potential for reduced availability of insurance on assets in "high-risk" locations etc.
	Chronic	

Source: Final Report Recommendations of the Task Force on Climate-related Financial Disclosures (2017)

Companies are required to disclose two types of climate-related risks: risks associated with the transition to a low-carbon economy (transition risks) and risks related to the physical impacts of climate change (physical risks). The risks are described in Table 1, but there is no specific method for evaluating them.

Of the possible physical risks, this guide deals specifically with flood risk. There are four key things to know about flood risk: 1) Floods and water-related disasters cause a lot of damage compared to other types of climate-related risks, 2) Water-related disasters make up a large share of insurance claims paid for natural disasters, 3) Flood risks may become even more significant in the future due to climate change, and 4) 94% of companies listed on the Tokyo Stock Exchange that have assessed physical risks have also assessed water-related disaster risks, which suggests that floods are considered a major risk by companies.

Methodology

The flood risk assessment proposed by this guide consists of the three phases (Figure 2):

1. Assessment of current flood risk (screening).
2. Assessment of future flood risk assessment in light of climate change.
3. Disclosure of risks.

First, the guide recommends an assessment of current flood risk (i.e., screening). Using the screening, companies can check whether their assets are currently at risk of flooding and whether flood risks are material to the company's finances. In Japan, companies can use a web-based application called "Navigation for Flood Risks" for the screening (Figure 3). By specifying a point or address, companies can understand the possible inundation situation (e.g., inundation depth) in that location. It shows the results of simulations performed by Japan's national and prefectural governments. Companies can choose two flood levels: a catastrophic flood (i.e., a one-in-1000-year flood) and a targeted flood mitigated by flood control infrastructure (i.e., a one-in-100-year flood). Since the navigation does not provide inundation information on rivers smaller than those covered by Japan's national and prefectural governments, as well as regions outside Japan, companies outside its scope can use the Global Hazard Maps created by global flood model simulations (e.g., Aqueduct, GAR2015, EC-JRC, LaRC-Flood project).

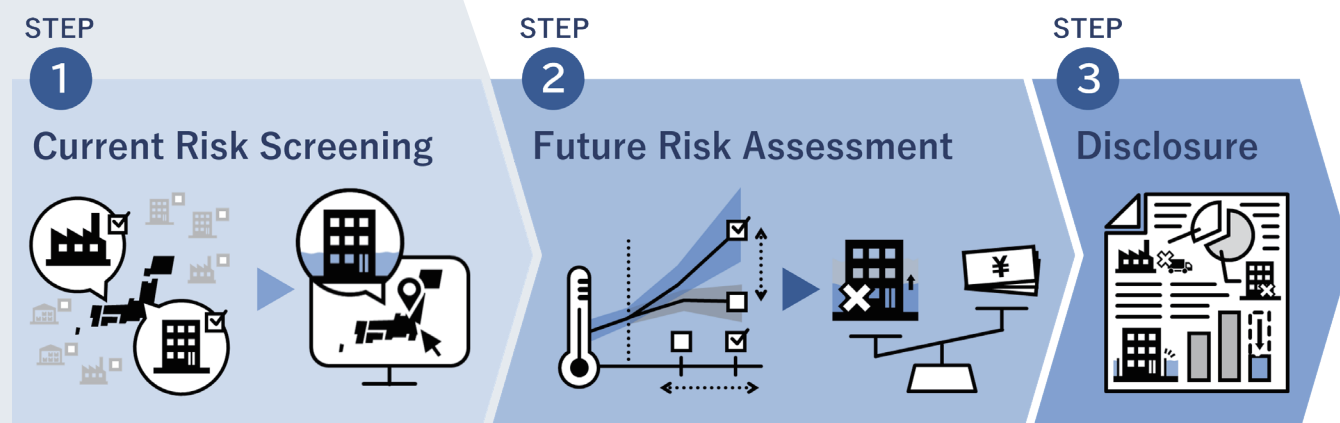


Figure 2 Main Steps for Flood Risk Assessments



Figure 3 Navigation for Flood Risks (in Japanese)

Notes: By specifying a point or address, companies can understand the possible inundation situation (e.g., inundation depth) in that location. It shows the results of simulations performed by Japan's national and prefectural governments. Companies can choose two flood levels: a catastrophic flood (i.e., a one-in-1000-year flood) and a targeted flood mitigated by flood control infrastructure (i.e., a one-in-100-year flood).

Second, if the screening indicates that a company has a flood risk, the guide recommends that the company performs a future flood risk assessment. The company identifies financial impacts, a flood magnitude, a time horizon, a scenario, and a method to assess future flood risks. There are two assessment methods: qualitative and quantitative. Each company can select either of them according to its purpose and proficiency in risk assessment.

Qualitative assessment can be conducted using various methods, such as the LaRC-Flood project, which provides global maps of flood frequency multipliers due to climate change. This enables companies to confirm future risk changes (increase or decrease) at any given location. On the other hand, companies can use a quantitative assessment to understand the degree of financial impacts and the profitability of flood adaptation measures. This assessment consists of four steps (Figure 4):

1. Capturing the current possible depth of inundation at the site.
2. Computing the costs caused by the current possible damage based on the inundation depth damage rate.
3. Obtaining future possible costs using a flood frequency multiplier.
4. Evaluating the incremental future risks.

Finally, if a company judges the impact of future flood risks on finances as material, it should disclose flood risk in its report. The guide recommends that the company clearly states the assumptions and models used in the assessment to increase comparability and verifiability.²

The quantitative assessment requires calculating the possible costs of damage using the inundation depth damage rate applied to the possible flood depth and value of the asset at each location. If a company does not have this information, it can use the inundation depth damage rate given in "A Manual of Economic Analysis for Flood Control Infrastructures (Draft)" prepared by MLIT.

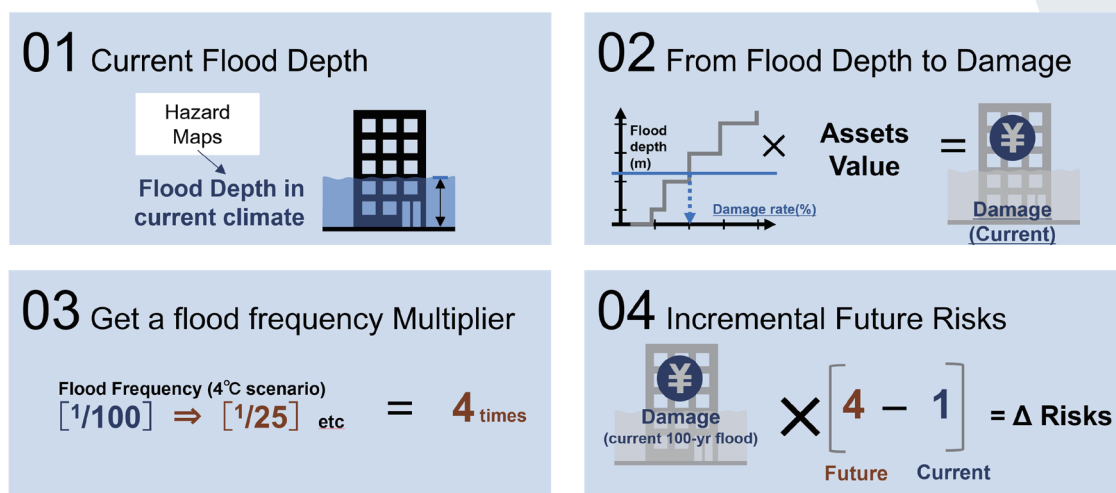


Figure 4 Quantitative Assessment

² The guide only covers specific impacts since assessing methods for some elements, such as flood impacts for supply chains, are not well-established. In other words, this guide only assesses some potential financial impacts of flooding.

TCFD suggests that companies disclose their strategies for addressing physical risks to investors and other stakeholders. It is crucial for companies to prepare in advance and implement measures to prevent and minimize the impact of floods, in order to ensure business continuity. The guide provides practical recommendations on how companies can prevent and minimize flood-related damage and ensure operational continuity in the event of a flood (e.g., Figure 5). In cases where these measures may not be cost-effective or feasible, the guide proposes alternative approaches based on past flood events and building lifespan.



Figure 5 **An Example of Countermeasures (Waterstop Board)**

Source: Omachi Plant, Saga Iron Works Co. (Omachi Town, Saga Prefecture)

Box 1: Flood Control Measures by Government Offices in Japan

This guide also introduces ways that Government offices manage the risk of flooding. One way is to improve flood control infrastructures, like building dams and levees. In Japan, these river improvements have been systematically implemented, and it has helped keep people safe during floods. For example, the Arakawa River, which flows around the center of Tokyo and was severely damaged by Typhoon Kathleen in 1947, has not experienced a major flood since then.

Another way to manage flood risk is to help people recover quickly after a flood happens. Japan has a unique team called “TEC-FORCE (The Emergency Disaster Response Team)” that helps with this. They work to assess damage, prevent more damage from happening, and assist with recovery efforts as quickly as possible.

It’s important to give information that can help them prepare for floods before they happen. MLIT is working with the Japan Meteorological Agency (JMA) to develop and utilize rainfall forecasting technology to reduce the damage caused by flooding. For example, since June 2021, MLIT, in cooperation with the Japan Meteorological Agency (JMA), has issued flood forecasts of water levels up to six hours in advance. In addition, they are working to provide evacuation information more quickly to contribute to wide-area evacuation.

Even though Japan has made a lot of progress in managing flood risk, heavy rainfall is expected to become more frequent and severe in the future due to climate change. To deal with this, the government is promoting a new flood management initiative called the “River Basin Disaster Resilience and Sustainability by All” to work together to manage flood risk.

Our full Guide can be found here:

https://www.mlit.go.jp/river/shinngikai_blog/tcfd/index.html (in Japanese)

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