TRAC
TRANSITION, RESILIENCE & ADAPTATION IN CAPITAL MARKETS

River Flooding Adaptation & Resilience (RIFAR) Challenge

RIFAR Marathon

Challenge Brief

Organised by:

Suruhanjaya Sekuriti
Securities Commission
Malaysia

In partnership with:

ICAEW

LEMBAGA URUS AIR SELANGOR
(LUAS)

SMG
A project by LLSB

JEFFREY SACHS CENTER
on Sustainable Development
SUNWAY UNIVERSITY, Malaysia

Suruhanjaya Sekuriti
Securities Commission
Malaysia

Table of Contents

Preface **1**

1. Introduction & Background **2**

1.1 River Flooding in Malaysia 2

1.2 Challenge Site: Taman Sri Muda, Selangor 3

2. Challenge objectives and overview **6**

2.1 Overview 6

2.2 Solution requirements 7

2.3 Eligibility 9

3. Competition structure and timeline **10**

3.1 Timeline 10

3.1.1 RIFAR University Challenge Webinar: 28 April 2026 (10:30am – 11:30am) 10

3.1.2 Team Registration 11

3.1.3 Site Visit: 11 June 2026 11

3.1.4 Checkpoint 1. Brief Submission: 17 June 2026 11

3.1.5 Checkpoint 2. Informational and Q&A Webinar: 30 June 2026 11

3.1.6 Final Submission Deadline: 16 July 2026 12

3.2 Terms and Conditions 12

3.3 Site-Specific Resources 13

4.0 Prizes & Recognition **13**

5.0 Contact & Support **13**

6.0 Appendix **14**

Appendix A: Additional Resources 14

Appendix B: Glossary of Terms 16

Appendix C: Judging Criteria 17

Preface

The River Flooding Adaptation & Resilience (RIFAR) Challenge is part of the Securities Commission Malaysia (SC)'s Transition, Resilience & Adaptation in Capital Markets (TRAC) initiative, which seeks to strengthen the role of the capital market in mobilising finance for climate transition, adaptation and resilience. Organised by the SC in partnership with ICAEW Malaysia, Lembaga Urus Air Selangor (LUAS), and Landasan Lumayan Sdn Bhd (LLSB) as the master developer for the Selangor Maritime Gateway (SMG), the RIFAR Challenge aims to build awareness and bring young minds together to protect Malaysia's rivers.

As a tropical nation with an extensive network of rivers, riverbanks, and riverine communities, Malaysia is highly dependent on its rivers as source of water, source of food, means of transportation, as well as livelihood for the riverine communities. However, our rivers are highly exposed to threats from extreme weather, pollution, and rapid urbanisation.

The RIFAR Challenge invites students to play a role in protecting, preserving and restoring our rivers, while strengthening their resilience to climate change. It is grounded in the belief that everyone has a role to play, whether by creating engaging and emotionally resonant content that raises awareness or designing adaptation solutions that also deliver broader climate mitigation and transition benefits.

1. Introduction & Background

1.1 River Flooding in Malaysia

Malaysia is a tropical nation primarily dependent on rivers as its primary freshwater source.[1] Its 191 river basins, covering 70% of the country's land area, sustain freshwater supply, agricultural systems, and ecological function. Approximately 97% of Malaysia's raw water supply for agricultural, domestic and industrial needs are derived from surface water sources, primarily rivers.[2]

However, the exacerbating impacts of climate change and heightened flood risks simultaneously expose the country's population to increased flooding. Around 22% of the total population reside in flood-prone areas.[3] Since 2000, flooding has accounted for 85% of all recorded disasters in Malaysia.[4] The December 2021 floods caused RM6.1 billion in nationwide damages and displaced over 400,000 people.[5]

There are three common types of floods: fluvial (river flooding, when rivers exceed capacity), pluvial (flash flooding, caused by rapid and excessive rainfall), and coastal flooding (caused by storm surges).[6] Climate projections indicate that flood risk across Malaysia's river basins will intensify under future emissions scenarios. The Klang and Selangor River Basins are projected to experience an approximately 20% increase in flood areal extent by 2100 relative to the 1971-2000 baseline, while rainfall intensity for 100-year return period events is expected to increase by up to 25% in the Klang River Basin.[7] Accelerating urbanisation compounds these projections by reducing natural water absorption and increasing surface runoff volumes into already-constrained drainage systems.

Projections suggest that up to 30% of national GDP is at risk if climate risks are not systematically addressed.[8] Despite the scale of climate and flood risk, adaptation financing has remained limited. Malaysia is projected to need RM392 billion to adapt

[1] https://www.nadma.gov.my/bm/media-2/berita/2759-urgent-action-needed-to-protect-and-restore-water-sources-span-chairman
[2] https://www.wwf.org.my/our_work/freshwater/#:~:text=Malaysia%20receives%20abundant%20rainfall%20averaging,and%20flow%20from%20the%20highlands.
[3] https://www.ukm.my/jkukm/wp-content/uploads/2025/3702/28.pdf
[4] https://www.bnm.gov.my/documents/20124/3770663/wb-bnm-flood-risks24.pdf
[5] https://www.dosm.gov.my/portal-main/release-content/special-report-on-impact-of-floods-in-malaysia-2021
[6] https://www.who.int/health-topics/floods#tab=tab_1
[7] http://unfccc.int/sites/default/files/resource/NRES_NC4_To%20UNFCCC_2024%20v1.0.pdf
[8] https://www.cidb.gov.my/eng/malaysias-climate-future/

and mitigate climate impacts over the next 50 years.[9] Mobilising private and blended capital to complement public investment will be critical to meet this need.

1.2 Challenge Site: Jalan Srikandi 25/14, Taman Sri Muda, Selangor

Selangor is Malaysia's largest contributor to national gross domestic product (GDP), accounting for approximately 26.2% in 2024.[10] The broader Klang Valley, encompassing Selangor and Kuala Lumpur, accounts for over 40% of national GDP and is home to a significant concentration of Malaysia's manufacturing, services, and logistics activities. As such, flood resilience in this region is critical not only for local communities but also for national economic stability.

Approximately 14% of the Klang Valley's administrative area is classified as flood-prone, directly affecting an estimated 500,000 people.[11] The Klang district recorded RM1.2 billion in losses from the 2021 floods, with Selangor's total flood losses reaching RM3.1 billion – the highest of any state.[12]

Aerial view of the 2021 floods in Taman Sri Muda (Malay Mail, 2021)

The challenge site is Taman Sri Muda, Shah Alam, a residential township situated within the Klang River Basin. The area sits approximately 2 metres above mean sea level, with an optimal flood containment level of 4 metres above mean sea level.

[9] https://www.nres.gov.my/ms-my/pustakamedia/Penerbitan/National%20Policy%20on%20Climate%20Change%202.0.pdf
[10] https://www.dosm.gov.my/portal-main/release-content/gross-domestic-product-gdp-by-state-2024
[11] https://www.adb.org/sites/default/files/project-documents/klang-river.pdf
[12] https://www.dosm.gov.my/portal-main/release-content/special-report-on-impact-of-floods-in-malaysia-2021

Taman Sri Muda has experienced multiple significant flood events in 1995, 2021, 2022, and 2025. The December 2021 flood was among the most severe recorded at the site. Floodwaters reached depths of approximately 4 metres, and an estimated 95% of the township was inundated.[13]

The site is highly exposed to compound flooding, involving a combination of:

(a) fluvial flooding (river overflow from Klang River),
(b) pluvial flooding (intense rainfall overwhelming drainage systems), and
(c) tidal influences that suppress outfall discharge capacity.

This convergence of factors makes the area particularly vulnerable and complex to manage.

Rationale for Site Selection

Taman Sri Muda has been selected as the challenge site due to:

(a) its history of severe and recurring flood events;
(b) its representation of urban flood risk within a high-density, economically significant region;
(c) the presence of multi-source flooding mechanisms (fluvial, pluvial, and tidal); and
(d) its suitability as a real-world case study for scalable and replicable flood adaptation solutions.

The surrounding area is predominantly residential, with a dense population that is directly impacted by flood events, affecting livelihoods, mobility and local economic activity.

Existing Flood Mitigation Measures

Several flood mitigation initiatives have been implemented or are currently underway, including:

(a) upgrading of pumping station capacity;
(b) river widening and deepening works to increase conveyance capacity; and

[13] https://www.thestar.com.my/metro/metro-news/2021/12/24/receding-waters-bring-relief-to-taman-sri-muda-residents

(c) strengthening and raising of river embankments (bunds/levees) along Klang River to prevent overflow during extreme rainfall events.

While these measures provide partial mitigation, they remain insufficient to address the full range of current and future flood risks, particularly under extreme weather conditions and climate variability.

Key Challenge for RIFAR Participants

Participants are expected to propose innovative and practical solutions that address the following factors:

(a) **Integrated Flood Management**

Solutions should consider the interaction between river systems, drainage networks, and tidal conditions.

(b) **Urban Constraints**

Interventions must be suitable for a dense, built-up residential environment with limited space for large-scale infrastructure.

(c) **Resilience & Adaptability**

Proposals should enhance the area's resilience to both current and future flood scenarios, including climate change impacts.

(d) **Feasibility & Scalability**

Solutions should be implementable, cost-effective, and potentially replicable across other flood-prone areas within the Klang River Basin.

(e) **Community Impact**

Consideration should be given to minimising disruption to residents and improving overall community preparedness and response.

2. Challenge objectives and overview

2.1 Overview

The Challenge focuses on fluvial flooding along the Klang River. Communities in this corridor, including Taman Sri Muda, face recurrent compound flood events driven by rainfall extremes, inadequate drainage capacity relative to upstream urban growth, and the interaction of river flows with tidal conditions.

The Challenge invites university teams to design an integrated flood mitigation intervention for Jalan Srikandi 25/14 (3°01'46.66"N 101°31'43.59"E), Taman Sri Muda, along the Klang River. Teams are required to combine an engineering concept with a capital market financing plan, and to identify a climate mitigation or transition co-benefit, such as renewable energy generation, that can support revenue recovery and long-term project sustainability.

2.2 Solution requirements

Your solution should address the following:

Component	*Description*
Technical and Design Aspects	• Present an intervention concept that addresses the identified cause of flooding at the site. • Ensure the design is scalable for wider application and modular, allowing phased implementation over time. • Incorporate a climate mitigation or transition co-benefit, such as renewable energy generation (e.g. solar, micro-hydro). • Include engineering or technical visuals (e.g. schematics, site plans, cross-sections, diagrams) that clearly communicate form, materials and function. • Include a social component that addresses the impact of the intervention on affected communities. • Specify an operations, maintenance and monitoring plan, including performance metrics.

Financial Model and Cost Recovery	• Propose a revenue-generating mechanism (e.g. renewable energy sales)
	• The financial model should include:
	  ○ Estimated capital expenditure (CapEx) and operational expenditure (OpEx)
	  ○ A funding structure, including a mandatory capital market instrument (e.g. green bond, sustainability-linked bond)
	  ○ Proposed blended financing structure (i.e. public funding, philanthropic capital, private capital)
	  ○ Revenue or repayment mechanism
	  ○ Projected returns, repayment timelines, and long-term maintenance cost considerations

Minimum Technical Performance Requirements

Category	Minimum Requirement
Technical Requirements: *Design criteria that must be met to ensure technical resilience*	
1. Flood mitigation performance	Must demonstrate ability to withstand 100-ARI flooding event
2. Renewable energy generation	Must incorporate at least one quantifiable climate mitigation or transition co-benefit (e.g. installed renewable energy capacity in kW, projected annual energy generation in MWh)
3. Social component	Must include justification on benefitting low-income communities (e.g. B40 communities).
4. Monitoring and Evidence	Must include defined performance metrics and a monitoring plan to measure intervention effectiveness over time.
Finance Requirements: *Financial viability and revenue generation expectations*	
1. Revenue generation	Must achieve full cost recovery and demonstrate a viable revenue-generating mechanism.
2. Financial Model	Must present estimates for CapEx, OpEx, maintenance costs, and repayment timeline.

2.3 Eligibility

To participate in the RIFAR Challenge, teams must meet the following requirements:

- The challenge is open to **students from all universities in Malaysia and Malaysian students enrolled in universities abroad** (open to undergraduate, Master's, and PhD students).
- A team must consist of **three to five members**.
- One team member must come from the **engineering faculty** and another from the **finance faculty**. Highly encouraged for 1 team member to be pursuing a Computer Science degree.
- Gender-diverse teams, in line with efforts to encourage broader participation in STEM disciplines.
- We strongly encourage:
    - Teams to be accompanied by a mentor such as a faculty advisor, industry expert, or graduate/professional engineer.
    - Teams to include members pursuing degrees in computer science, environmental science, social science or other subjects are welcome as flood resilience is an inter-disciplinary issue.

3. Competition structure and timeline

3.1 Timeline

Date	Event	Venue/Mode
28 April 2026	RIFAR University Challenge Launch Webinar	Zoom
12 May 2026	Deadline to register	Register at https://tinyurl.com/rifar2026registration by **Tuesday, 12 May 2026**.
11 June 2026	Site Visit	
17 June 2026	Checkpoint 1: Submission Deadline	Google Form
30 June 2026	Checkpoint 2: Webinar	Virtual (Zoom)
16 July 2026	Final Submission Deadline	Google Form
30 July 2026	Finalist Pitch	Securities Commission Malaysia
TBA	RIFAR Showcase: Announcement of Winners	

Note: Dates are subject to change, and will be communicated to teams accordingly.

3.1.1 RIFAR University Challenge Webinar: 28 April 2026 (10:30am – 11:30am)

The webinar will feature an exciting lineup of experts who will share insights on the importance of rivers from the perspective of Malaysia's climate adaptation readiness and resilience, the official launch of the challenge and exclusive tips and resources for participants. Speakers include:

- **Dato' Mohammad Faiz Azmi**, Executive Chairman, Securities Commission Malaysia

- **Puan Haslina binti Amer**, Chief Assistant Director, Lembaga Urus Air Selangor (LUAS)
- **Encik Ashazry bin Anuar**, Director of Project Management, Landasan Lumayan Sdn Bhd (LLSB)
- **Shenola Gonzales**, Head of Malaysia, ICAEW

3.1.2 Team Registration

Team leaders / accompanying lecturer needs to **complete the Registration Form at** https://tinyurl.com/rifar2026registration by **Tuesday, 19 May 2026.**

Teams that fail to register by the above deadline will not be eligible to participate in the Challenge.

3.1.3 Site Visit: 11 June 2026

The site visit is to allow participating teams to personally observe the proposed site for the challenge and engage directly with the site and experts. Please refer to the River Safety Guide for more information.

3.1.4 Checkpoint 1. Brief Submission: 17 June 2026

Teams are invited to submit **2-pager briefs of their proposed solutions by 17 June 2026**. These are ungraded and intended as an opportunity for teams to receive high-level feedback ahead of their final submissions by 16 July 2026.

3.1.5 Checkpoint 2. Informational and Q&A Webinar: 30 June 2026

Checkpoint 2 is a live webinar where teams can hear from technical and financial experts on adaptation infrastructure and financing. It is also an opportunity for teams to raise final clarifications on technical, financial, and design expectations before completing their full submissions. It offers a dedicated Q&A segment with experts, allowing teams to validate assumptions and resolve uncertainties ahead of the 16 July final deadline.

3.1.6 Final Submission Deadline: 16 July 2026

Participating teams are required to upload their submissions via the Submission Portal by **16 July 2026** with the following material:

10-page Design Brief (PDF) including:
• Technical concept & flood resilience strategy • Capital market financing model (CapEx, OpEx) • Revenue generation strategy (≥10% recovery) • Visuals: architectural renderings / schematics / diagrams
3-minute Video Pitch (MP4) summarising:
• Problem & concept • Anticipated impact of proposed solution • Financial/implementation model

3.2 Terms and Conditions

All participants must comply with the official Terms & Conditions of the RIFAR Challenge. For more details, refer to the **Terms & Conditions** here.

3.3 Site-Specific Resources

Site-Specific Data: Jalan Srikandi 25/14, Taman Sri Muda, Shah Alam, Selangor

	Type of Data	Sources
1	Topography & elevation maps	Ground Level: Between 3.11 to 3.40m
2	Land use classification	Residential

4.0 Prizes & Recognition

The top three winning teams will receive cash prizes.[14]

Prizes	Cash Prizes
Winner	RM25,000
1st Runner Up	RM15,000
2nd Runner Up	RM10,000

5.0 Contact & Support

For further information, please visit the Challenge Website at www.sc.com.my/trac/rifar or contact Malaysia@icaew.com.

[14] Selection of winning teams is subject to conditions outlined in the Terms and Conditions.

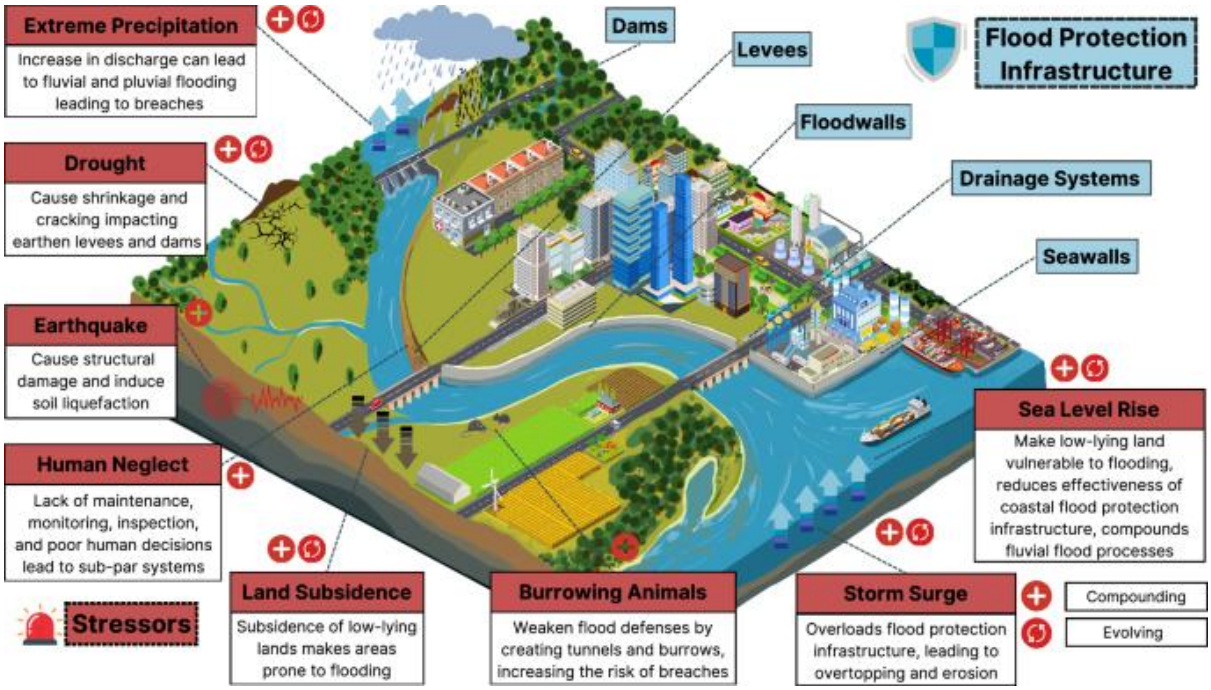
6.0 Appendix

Appendix A: Additional Resources

A.1. Flood adaptation infrastructure

- Azhar, M., Kane, B., Vahedifard, F. et al. (2025). ***Comprehensive portfolio of adaptation measures to safeguard against evolving flood risks in a changing climate.*** Commun Earth Environ 6, 824. https://doi.org/10.1038/s43247-025-02779-z

Stressors impacting flood protection infrastructure and examples of adaptation measures



	Adaptation Classification	Riverine Flood Adaptation Measures
1	**Infrastructure / Technological** Involve the development or modification of physical structures or technologies	• Heightening of Levees • Notching • Underseepage control • River dredging • Intentional breaches • Dam rehabilitation • Construction of weirs • Construction of flood walls • Construction of channels and floodways

		• Construction of landslide stability berms • Construction of closure structures • Construction of revetments • Construction of gabion walls
2	**Nature-based** Involve the use of natural systems and processes	• Set-back • Wetland restoration and creation • Vegetation or levee slopes
3	**Institutional** Involve changes or developments in governance, policies, and organisational structures	• Flood monitoring and warning systems • Inspections and maintenance • Effective groundwater management • Establishment of multi-layer safety • Real-time control of reservoirs and detention basins • Managing residual flood risk behind levees

A.2. Financing adaptation infrastructure

- Oehling, D., Fishcer, G., Sivaprasad, D. et al. (2025). ***The Private Equity Opportunity in Climate Adaptation and Resilience*.** Boston Consulting Group. https://www.bcg.com/publications/2025/investment-opportunities-in-climate-a-and-r
- Brandon, C., Aggarwal, A., Kratzer, B. et al. (2025). ***Scaling finance for climate adaptation: A descriptive analysis of 162 cases of financial instruments for climate adaptation*.** Prepared by the World Resources Institute (WRI) for the G20 Sustainable Finance Working Group. https://g20sfwg.org/wp-content/uploads/2025/07/Scaling-finance-for-climate-adaptation_FINAL-G20-Oct-9-2025.pdf

Appendix B: Glossary of Terms

Term	Definition
Blended Finance	A financing approach that combines public, private, and philanthropic funds to attract investment into development or climate projects.
CapEx (Capital Expenditure)	Initial investment or upfront costs required to build infrastructure or implement a project (e.g., cost of materials, equipment, construction).
Cost Recovery	The process of recovering project costs through revenue-generating activities (e.g. solar energy sales).
Feasibility Study	A preliminary analysis that assesses whether a proposed solution is viable technically, economically, and legally. Often includes risk analysis, timelines, and assumptions.
Fluvial Flooding	Also known as river flooding, it typically occurs when water level in a river or stream rises and overflows onto the surrounding banks, shores, and neighbouring land.
Green Bonds	Bonds issued to raise funds for environmentally sustainable projects.
Modularity	The ability to design a solution in smaller, independent phases or units that can be implemented over time.
Pluvial flooding	Surface flooding caused by heavy rainfall overwhelming drainage systems, especially in urban areas.
OpEx (Operational Expenditure)	Ongoing costs required to operate and maintain a project or infrastructure over time (e.g., salaries, maintenance, utilities).
Schematics	Technical diagrams representing design layout, systems, or flows.

Appendix C: Judging Criteria

Component	Criteria	Weightage	Description
Technical	Feasibility and Technical Soundness	20%	Assesses how well the solution responds to the identified river-related flooding issue in Selangor. Evaluates technical strength, modularity, scalability, and real-world practicality.
	Scalability and Implementation Potential	15%	Assesses potential for the solution to be scaled, phased, or replicated in other river-related contexts. Looks at clarity of implementation pathway and practical rollout considerations.
Finance	Revenue Generation Stream	20%	Evaluates clarity and viability of the revenue generation strategy, requiring full cost recovery with benefits for higher profitability.
	Finance and Capital Market Readiness	15%	Assesses how ready the solution is for capital market financing. Looks at clarity of CapEx/OpEx planning, use of instruments like green bonds, and strength of financial metrics (e.g., risks, investor types).
General	Innovative Solutions	10%	Assesses originality and creativity in the proposed solution. Looks for innovative use of technology, nature-based design, hybrid approaches, or integration of community and revenue features.
	Community and Stakeholder Integration	10%	Assesses how well the solution involves and benefits local communities and stakeholders.
	Presentation and Communication	10%	Assesses clarity, structure, and delivery of the presentation (video and/or live). Looks at team coordination, visual effectiveness, messaging, and time management.