



# Webinar series: Challenges, lessons, and innovations for IFRM

## Session 4: Economics and Finance for IFRM

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TA 9634-REG: Strengthening Integrated  
Flood Risk Management

# Webinar Agenda

1. Welcome and opening remarks from ADB
2. Overview of the KSTA project and introduction to the Webinar series
3. Main content:
  - Approaches to economic analysis for IFRM measures (Guillaume Dulac)
  - The role of flood insurance for post-disaster recovery (Jane Toothill)
4. Discussion, question and answer



# TA 9634 REG 'Strengthening Integrated Flood Risk Management'

Overall objective:  
*Strengthen the design and implementation of IFRM solutions, enhancing knowledge and application of IFRM strategies*



Commenced in February 2019,  
concludes in June 2022

8 Countries: Indonesia, Philippines,  
Viet Nam, Myanmar\*, Bangladesh,  
India, Nepal and Pakistan

# Webinar series

Date	Title
March 9	A country-scale view on IFRM and applications of global datasets
March 15	Application of an IFRM Approach at a River Basin Level
March 22	Coastal Flood Risk Assessment
March 30	Economic and Finance for IFRM
April 5	Outlook for IFRM and Ways Forward

## ***Objective:***

*To share our experiences from implementing the KSTA project and reflect on issues and lessons learned for applying IFRM in practical applications*





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# Economics and finance for IFRM

Some insights on IFRM Economics in  
development banking

Guillaume Dulac  
IFRM Economist  
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# What is specific about flood management in development banking?

- Long time horizon (20-50 years) - public perspective, climate change
  - Uncertainty – on existing data and development trajectories
  - Complex topic vs. ‘landing the operation’, i.e. decision-oriented and standardized expectations under limited time and resources
- 
- Tradeoff between robustness and accuracy
  - Critical (modelling) choices (maximize the value of information)
  - Acknowledge of a specific economic approach (vs engineering)

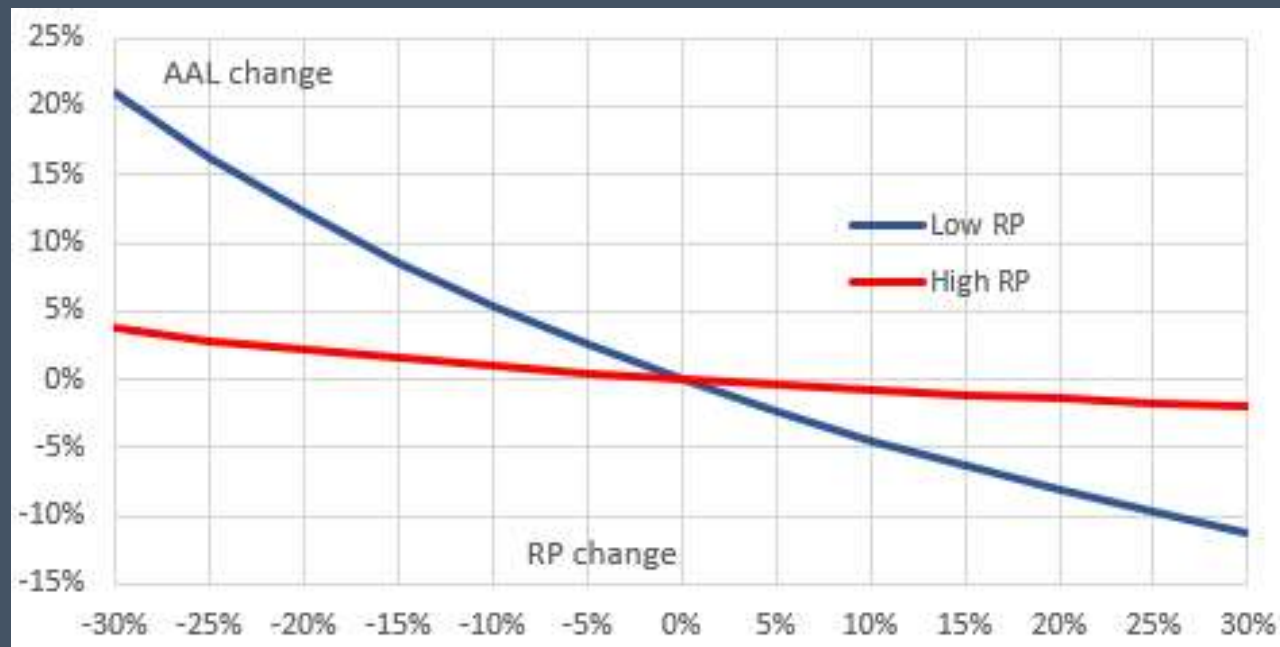
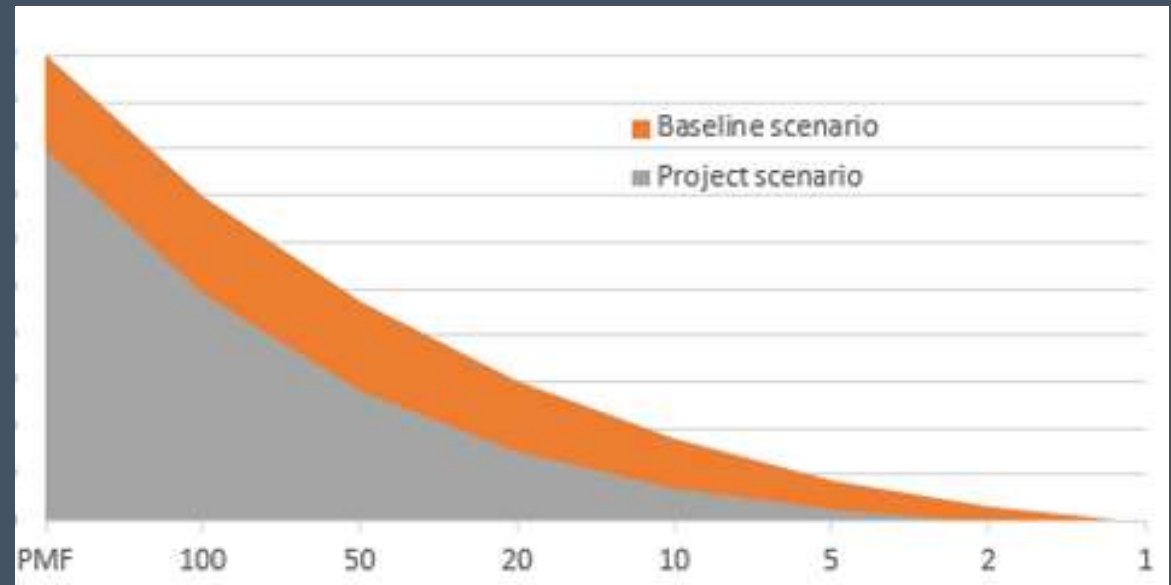
# IFRM Economics Essentials (1)

- Avoided damages - baseline vs. project,
- Economics vs. finance - sustainability and O&M,
- Conservative approach - avoid overestimate benefits:
  - Perimeter (e.g. hazard types/sectors)
  - Depth (e.g. direct/indirect losses)

# IFRM Economics Essentials (2): AAL

$$AAL = E(X) = \int_0^M x * P(X = x) dx$$

$$AAL = \int_0^M P(X > x) dx$$





# IFRM Economics Essentials (3)

- The time factor:
  - Set the rate (6% or 9%) before setting the time horizon
  - Hitting a moving target – exposure intensification/extensification
- Sector analysis:
  - Surface based methods (property, agriculture)
  - Traffic based methods (transport, utilities)
- Key questions for each:
  - Primary data vs. literature, transfer legitimacy (West vs. DMCs)
  - Replacement costs vs. new (Build Back Better ~+30%)
  - Indirect effects higher on low frequency
  - Distributional effects

## IFRM Economics Essentials (4)

- Fatalities
- Controversial to a certain extent – quantification of the missed economic productivity is accepted
- One fitted model - Penning-Rowsell et al. (2005) - uncertain transferability, adjust on a case by case basis

$$F = [(v + 1.5) * d + DF]^2 * \frac{2N}{100} * (P_1 + P_2) * (EWS + AV)$$

- The case of FFEWS – building on FHRC model (beware overestimate of benefits)

$$B = (D_a^p - D_a^b) * \eta = AAL * \eta * (\rho^p R^p P_a^p P_r^p P_e^p - \rho^b R^b P_a^b P_r^b P_e^b)$$



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# Economics and finance for IFRM

A perspective based on recent flood events and the insurance markets in Thailand, Germany and the UK

Dr Jane Toothill  
Insurance Specialist  
[jane.toothill@jbarisk.com](mailto:jane.toothill@jbarisk.com)

# Content

- Thailand, Germany and the UK: flooding and insurance
- Insurance basics
- Insurance penetration
  - Understanding the benefit
  - Understanding the risk
  - Affordability
  - Availability
- The way forwards?

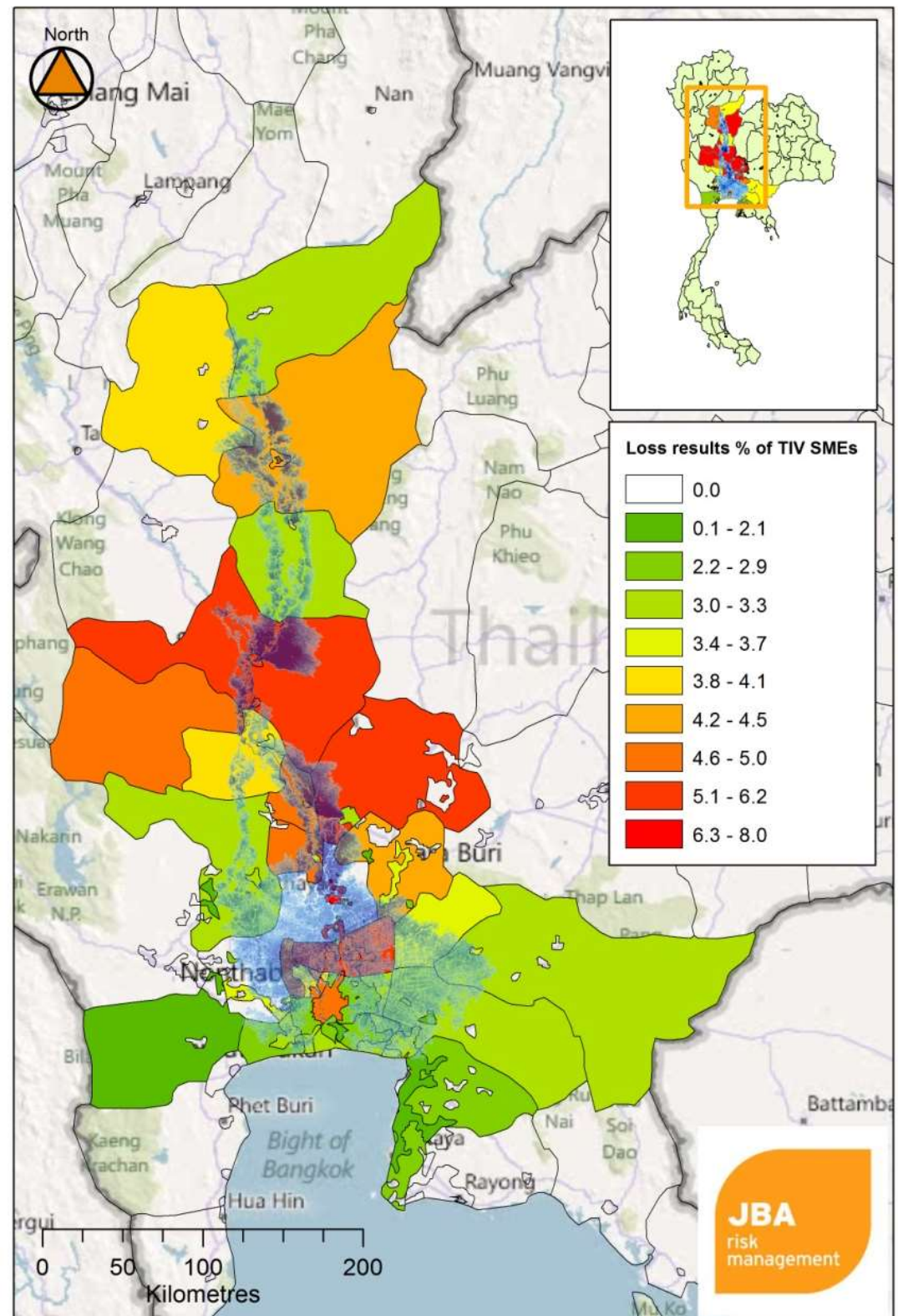
# Thailand

Major flooding in 2011  
Global losses following  
flooding of 7 industrial  
sites

Economic / insured  
damage \$46.5<sup>(1)</sup> / \$15  
billion<sup>(2)</sup>

Insurance cover is  
optional

Household insurance  
penetration 1.9%<sup>(3)</sup>





# Germany

- Moderately frequent major river floods: 2002, 2013 and 2021
- Flood insurance available as optional add-on cover; penetration 46%<sup>(4)</sup>



All exchange rates from <sup>(8)</sup>

Event	Date	Economic losses (USD)	Insured losses
Austria, Czech Republic, Germany, Poland (b)	August 2002	\$15 billion <sup>(5)</sup>	\$2.25 billion <sup>(5)</sup>
Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria (c)	May-June 2013	\$19.25 billion <sup>(6)</sup>	£4.3 billion <sup>(6)</sup>
Belgium, France, Germany, Netherlands, Switzerland	July 2021	\$53 billion <sup>(7)</sup>	\$13 billion <sup>(7)</sup>

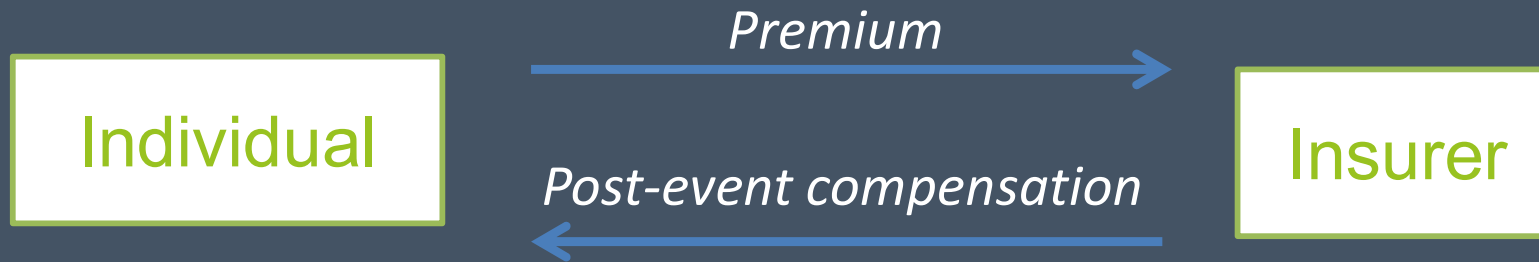


# UK

- Frequent river, surface water and coastal floods, e.g. 1998; 2000; 2007; 2013; 2014; 2015/16; 2019/20<sup>(9)</sup>
- Average annual insured cost
  - \$450m – \$1.3bn pa<sup>(10,11)</sup>
- 2007 floods:
  - \$4.5 – \$7bn insurance loss today<sup>(9)</sup>
- Flood defence investment
  - 2015-2021: ca. \$3bn pa
- Flood insurance included in most household policies; penetration ca. 95%



# Insurance basics & benefits



- Acceptance of risk in return for a premium
- Significant reduction in burden on governments and tax payers after a flood
  - Prior planning – increases preparedness
  - Certainty of compensation after a loss for homeowners
  - Governments can focus on post-event response & recovery
- Mutualisation of risk
- Transfer of costs to the global reinsurance markets

## Thailand 2011: Who paid?<sup>(12)</sup>



16 re/insurers: \$11,978m 89%

33 re/insurers: \$1,516m 11%

ACE, ACR, Allied World, Aterra Capital, Amlin, Arch, Argo, Ariel, Asian Re, Aspen, AXIS, Beazley, Best Re, Chubb, Endurance, Flagstone, Hardy, HCC Insurance Holdings, IAG, Labuan Re, Lancashire, Markel, Montpelier Re, MRB, Novae, Platinum, Ren Re, Taiping Re, Thai Re, Transatlantic, Travelers, Validus, White Mountains

Company	Net Loss Est. /USDmn
MS&AD	3,000
Lloyd's	2,200
Tokio Marine	1,417
NKSJ	1,290
Toa Re	956
Munich Re	680
Swiss Re	680
QBE	261
Hannover	254
Everest Re	218
Fairfax	202
CCR	194
SCOR	186
XL Group	185
Korean Re	135
Partner Re	120

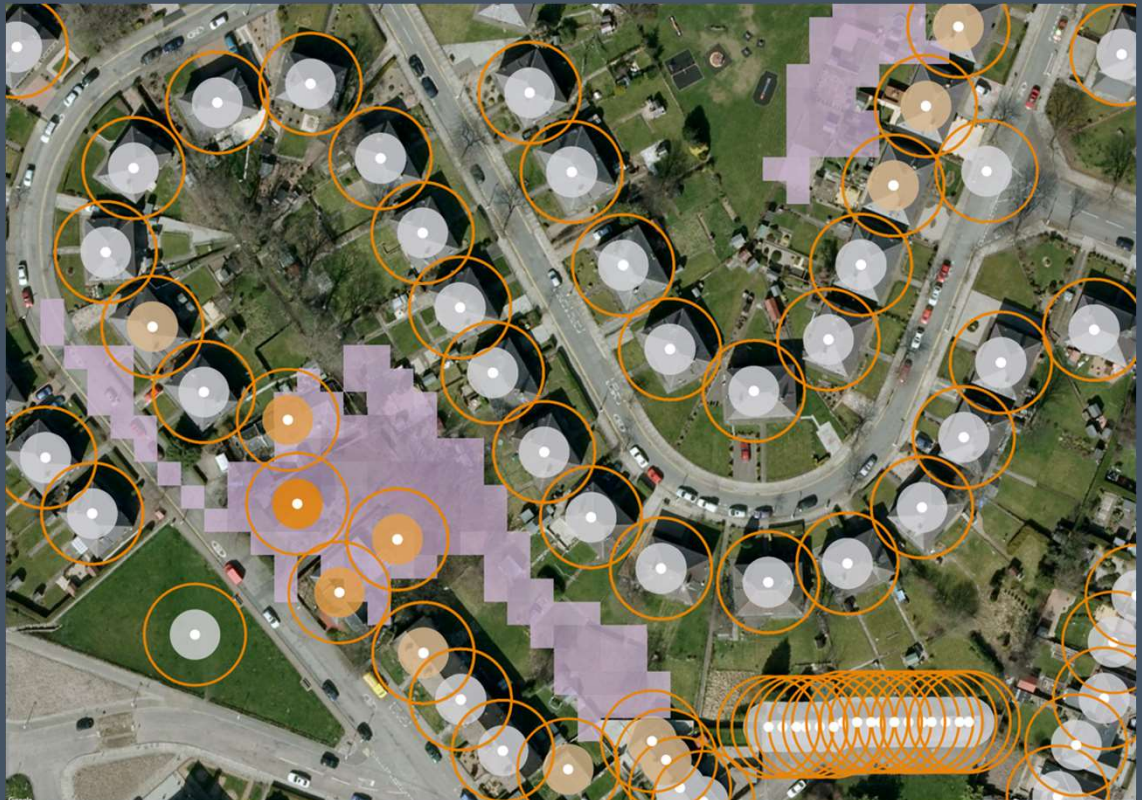
# Take up of flood insurance is variable

	UK	Germany	Thailand (residential)
Household insurance penetration	Ca. 95%	46% <sup>(11)</sup>	1.19% <sup>(12)</sup>
Flood frequency	High	Moderate	High/low
Availability of flood insurance	Incl. in household policies	Available as add-on to policy	

- What impacts insurance take up rates?
  - Availability
  - Affordability
  - Perceived benefit

# Affordability

- How well off is the individual?
- How costly is the policy?
- Technical price
- High risk = high cost





## Variability in technical price

Average Annual Damage = 0.0338  
Technical price (average annual damage) for \$200,000 property = <\$6,760

Average Annual Damage =  $1.53 \times 10^{-24}$ . Technical price for \$200,000 property = <\$0.01

## What is the risk?





Danube

Deggendorf

Fischerdorf

100-year protection  
along the Danube

Isar

30-year protection  
along the Isar



# What is the risk?

- Helpful history?
- Maps help improve understanding of flood risk – not just for insurers but also for homeowners

River flood



Surface water flood



# Government

*Maintenance of flood defences*

*Awareness of risk and mitigation measures*

*Regulated / well-functioning insurance market*

*Reduce burden on government*

# Homeowner

*Reasonable steps to prevent & mitigate damage*

*Premium*

# Insurer

*Aid recovery following a flood*

*Post-event compensation*

# Options

- Compulsory flood cover?
  - Removes need for state to step in post-event
  - Some homeowners unable to afford
- Risk based?
- Uniform premiums?
  - Reduces incentive to adapt / minimize risk
  - Opt out?
- Nationwide insurance scheme?
  - All properties or selective?

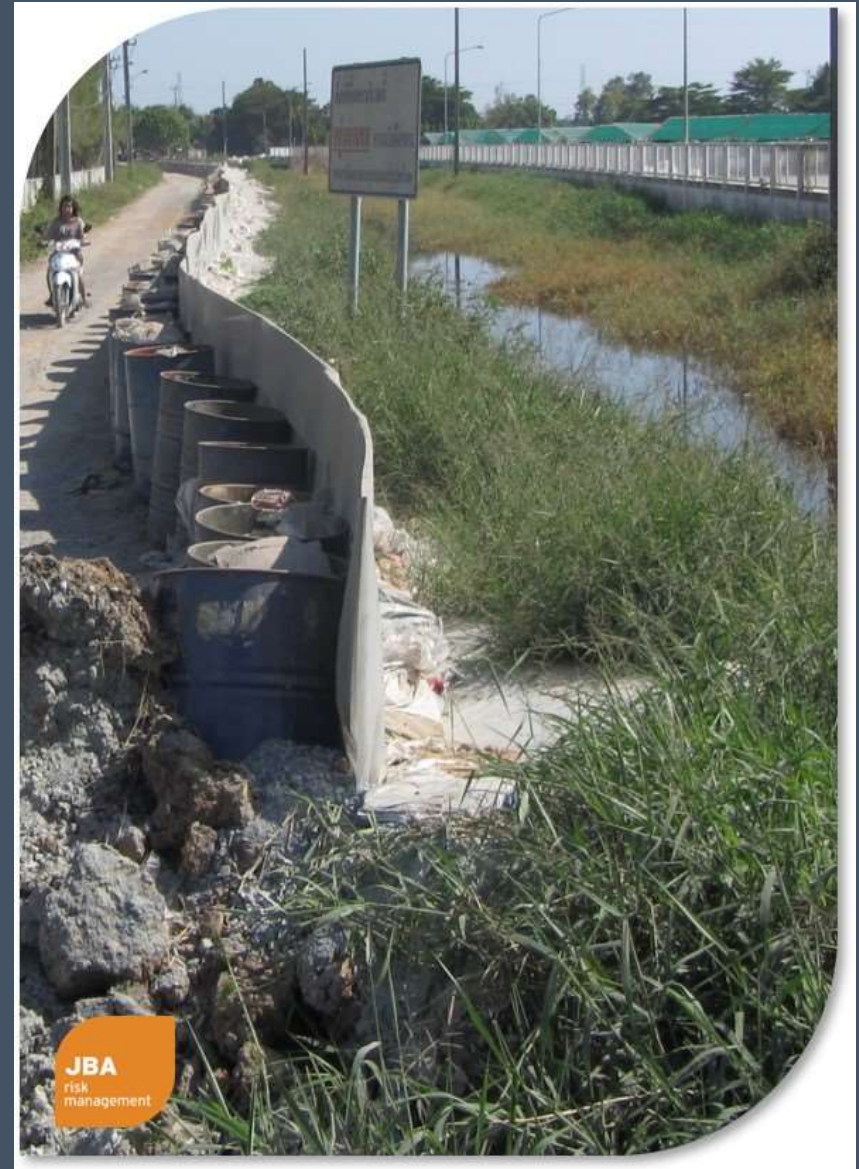
## In conclusion...

Insurance can significantly reduce the burden of losses on governments and tax payers following a flood

There is appetite to offer flood insurance among re/insurers

BUT there is a need to narrow the insurance gap if countries are to maximise the benefit of insurance

Governments, insurers and homeowners all have a role to play



Questions or comments?  
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Thank you



## SESSION 5

APR

5

2022

Tuesday

## Outlook for IFRM and ways forward

Reflections on the state of the flood risk management sector in Asia and development outlook.

16:00

Manila  
time

90 minutes



**Ian Wood**

TA9634 Team Leader and  
Climate Change Specialist  
Landell Mills



**Geoff Wilson**

Senior Water Resources  
Specialist, ADB

# See you next week!

For recordings and any follow up questions, please access the event site at the ADB Knowledge Events in Development Asia <https://events.development.asia/learning-events/challenges-lessons-and-innovations-strengthening-integrated-flood-risk-management>