Introduction to Fathom

Fathom is a Swiss Re subsidiary

Formed out of the University of Bristol

Co-founded by a team of world-leading scientists

Aiming to provide comprehensive water risk intelligence for the entire planet

Research has always been a critically important part of our company’s development

Our research output

We publish cutting-edge research in industry-leading publications, subjecting our work to critical testing and academic peer review, while helping support the advancement of flood risk research through the transparency of our methodologies and results.

60+

Research papers underpinning Fathom's products

88,000

Academic citations for research written by Fathom's experts

AGU ADVANCING EARTH AND SPACE SCIENCES
Water Resources Research

nature climate change

ERL ENVIRONMENTAL RESEARCH LETTERS

International Journal Of Climatology
The Royal Meteorological Society Journal of Climate Science

EGU European Geosciences Union

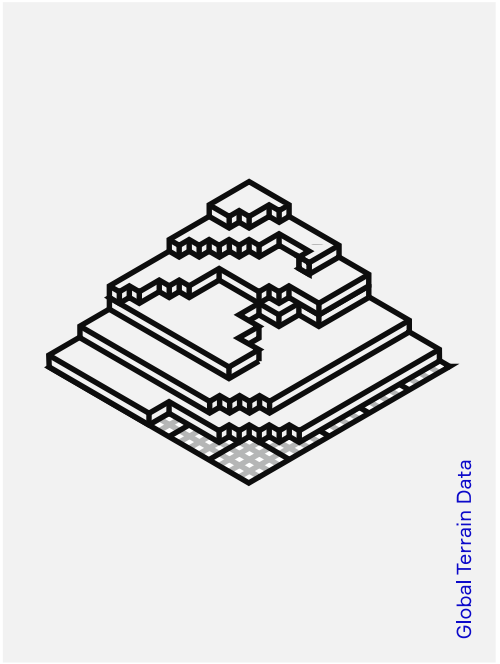
Replicating the success:

Our clients are anyone who needs to understand flood risk:

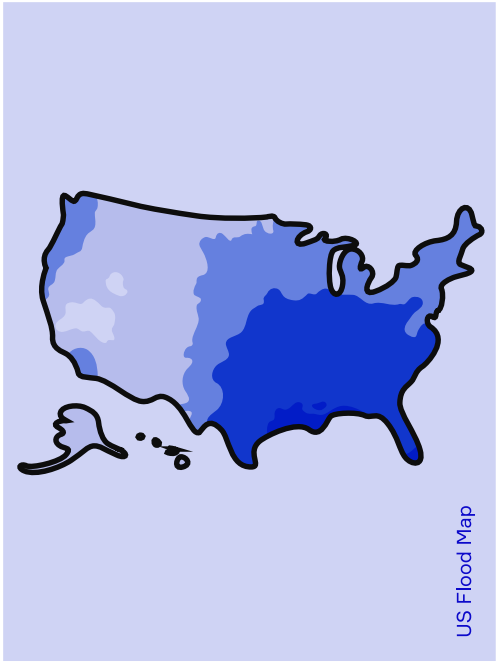
- Inland or on the coast
- Now or in the future
- Anywhere in the world

Insurance	Financial Markets & ESG	Engineering	Public Sector & International Development
AON	BlackRock	ARUP	THE WORLD BANK
HISCOX	NYSE, ICE	WSP	BILL & MELINDA GATES foundation
SOMPO INTERNATIONAL	MSCI	TETRA TECH	Public Safety Canada
AXA	Morgan Stanley, BCG	AECOM	Australian Government Geoscience Australia
canopius	pwc	Jacobs	Texas Water Development Board
Allianz	McKinsey & Company	MOTT MACDONALD	Florida Department of Environmental Protection

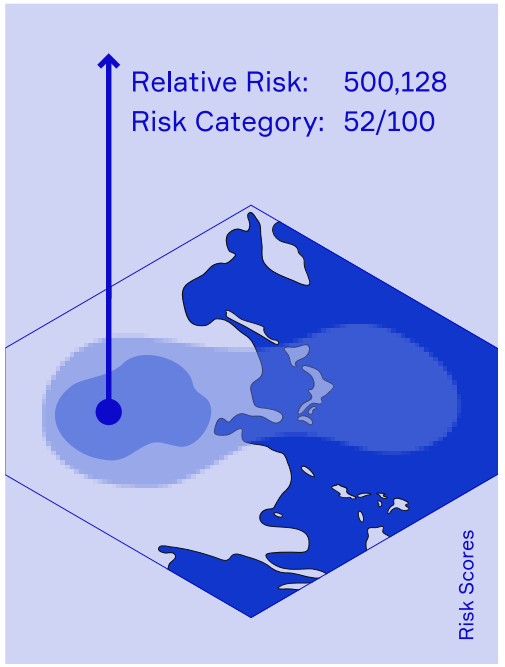
Our datasets



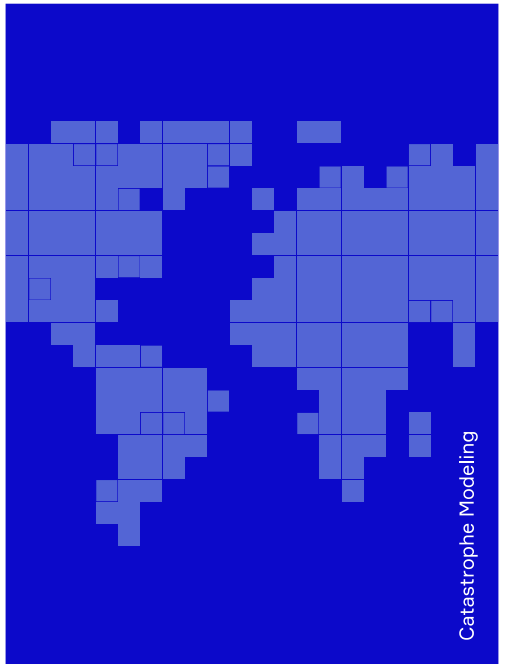
Global Terrain Data



Flood Maps



Risk Scores



Catastrophe Models

Fathom API

Direct provision

Risk Scores

Two main forms:

—Relative Risk
—Risk Category

Scan portfolios at scale to identify sites at risk of flooding

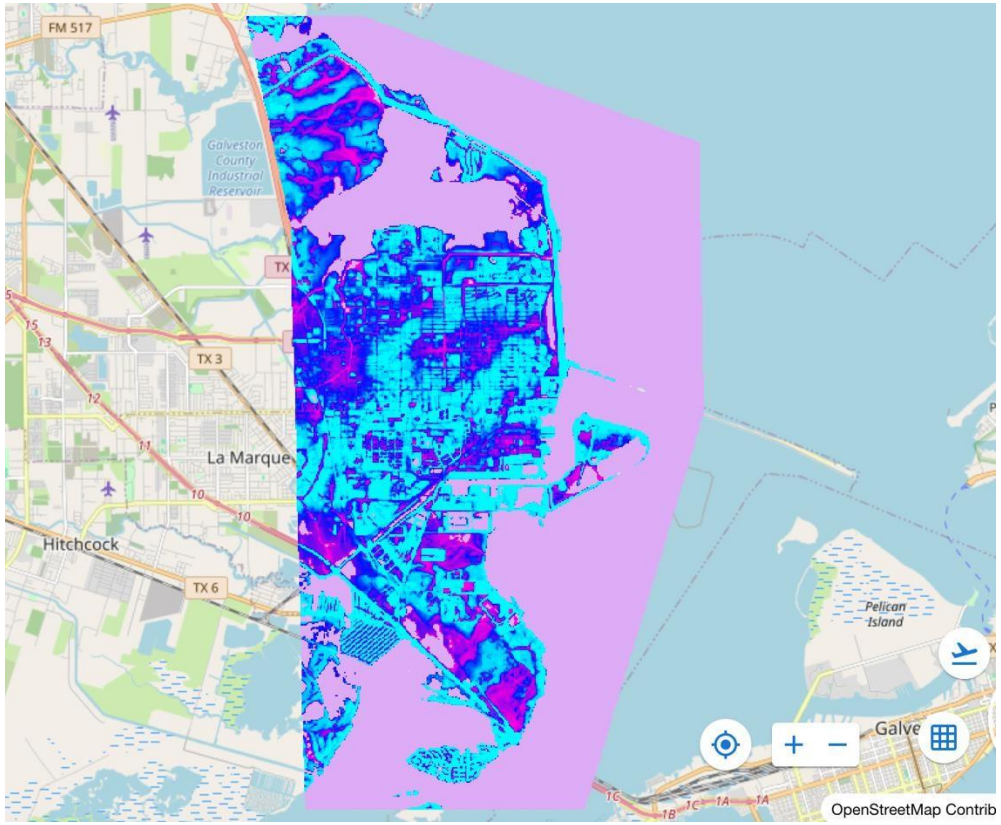
Visualise flood risk using Geotiff data

	Relative Risk	Risk Category
Range	0 – 1,000,000	0 – 100
Represents	Granular quantification of risk inside the extreme flood plain Average Annual Loss (AAL) for uniform exposure	Categorization of risk inside ***and outside*** the extreme flood plain 1 – 5: Proximate risk to extreme flood 6 – 100: Categorization of Relative Risk
Usage	Where a (roughly) linear relationship with expected loss is required Inside the flood plain	Where a categorized score is needed inside and outside the flood plain **Over 90% of global land area is within Risk Categories 1 - 100**
Type	Fluvial, Pluvial, Coastal Inland (fluvial & pluvial), Flood (inland and coastal) Global excluding Greenland and Antarctica	

Rapid Portfolio Scan

Site	Relative Risk	Risk Category	Interpretation
Site 1	980,000	98	Extremely high risk, deep in floodplain. Significant expected loss.
Site 2	750,000	95	Very high risk in floodplain. Likely to flood during extreme events.
Site 3	420,000	80	High relative risk with consistent flood exposure.
Site 4	180,000	55	Moderate risk, within floodplain but not in deepest areas.
Site 5	120,000	40	Lower floodplain risk, likely protected or in elevated zones.
Site 6	65,000	25	Marginal flood exposure. Inside floodplain but low expected loss.
Site 7	3,000	5	Outside floodplain, near its boundary. Proximate risk.
Site 8	1,000	3	Well outside the floodplain. Very low hazard, but nearby river system.
Site 9	0	1	No meaningful flood risk under modelled conditions.
Site 10	500,000	70	Solidly at risk, within a defended flood zone.

Visualised Impact



Fathom's Global Flood Map — The first high-resolution global flood map covering all flood perils and climate futures.

Global coverage

Fathom's data cover the entire planet, including all the world's river channels.

All flood perils

Riverine flooding, flash flooding and coastal flooding comprehensively represented.
Defended and undefended layers

High resolution data

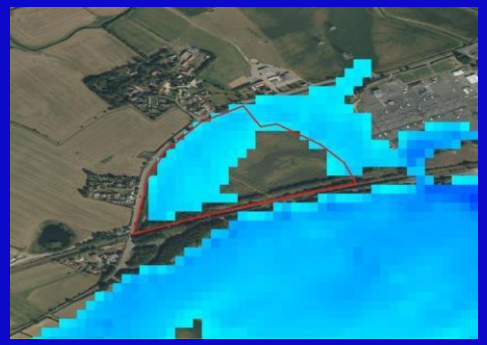
~30 m resolution globally, with ~10 m data across multiple countries.

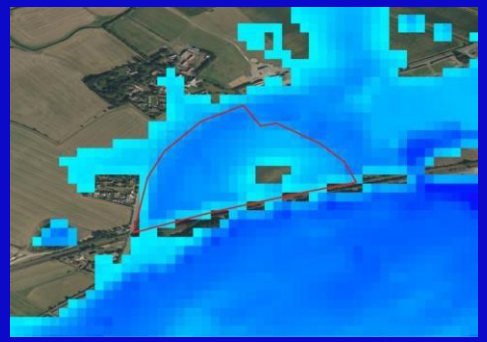
Climate change

Complete representation of all future climate scenarios, out to 2100.

Analysis

Get a deep-dive analysis into sites at risk of flooding





Fluvial (Defended Areas)
- Severity increasing: Max depth rises from 60 cm to 73 cm; mean depth more than doubles.
- Wider exposure: Flooded area increases from 40% to 49%.
- Implication: Defences are increasingly under pressure–risk is growing even in protected areas.

Fluvial (Undefended Areas)
- Persistently high exposure: Flooded area remains flat at ~89%.
- Severe but stable hazard: Depth metrics show only marginal increases, indicating saturation of risk.
- Implication: These areas remain high-risk and potentially uninsurable without intervention.

Pluvial (Surface Water Flooding)
- Rapid escalation: Mean depth rises 77% (22 cm → 39 cm); max depth climbs to 95 cm by 2070.
- Urban vulnerability: Site flood extent increases from 55% to 60%.
- Implication: Pluvial risk is emerging as a critical concern, especially in dense urban settings.

Strategic Insight
Flood risk is intensifying across all categories. Defended areas may no longer offer sufficient protection, while pluvial flood risk is rising fastest. Investment, insurance, and infrastructure decisions must reflect this new baseline.

Site Assessment - Modified Flood Depths Over Time: Comparison

Perils	Metric	2020	2030 SSP2_4.5	2050 SSP2_4.5	2070 SSP2_4.5
Fluvial defended	Maximum depth	60	64	68	73
Fluvial defended	Percentage of site flooded	40	42	46	49
Fluvial defended	Mean depth	10	13	17	21
Fluvial undefended	Maximum depth	160	161	163	165
Fluvial undefended	Percentage of site flooded	88	88	89	89
Fluvial undefended	Mean depth	85	86	87	88
Pluvial	Maximum depth	70	82	90	95
Pluvial	Percentage of site flooded	55	56	58	60
Pluvial	Mean depth	22	29	34	39

Fathom's Global Flood Cat – The first truly global flood catastrophe model to consider both inland and coastal perils.

Globally consistent

Flood coverage at 30m resolution for all major flood perils

Major asset types / coverages

Residential, commercial and industrial
Buildings, contents and business interruption coverages

Sophisticated risk differentiation

Including custom flood defenses and risk modifiers

Aggregated data and coarse geocoding

Using different spatial distributions for different asset types

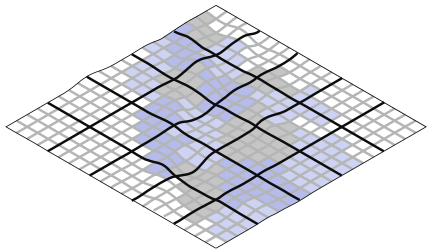
Transparent and customizable

Download hazard and vulnerability
Use your own vulnerability

Comprehensive uncertainty representation

Detailed Monte Carlo sampling
Nil and total losses
'within-event' uncertainty correlation

From hazard to risk



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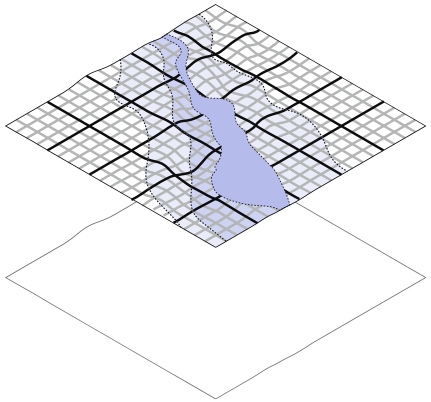
Event set

Spatial extent of events

— Characterized by size, location, and return period of flooding per grid cell.

— Millions of events representing 10,000 years of activity.



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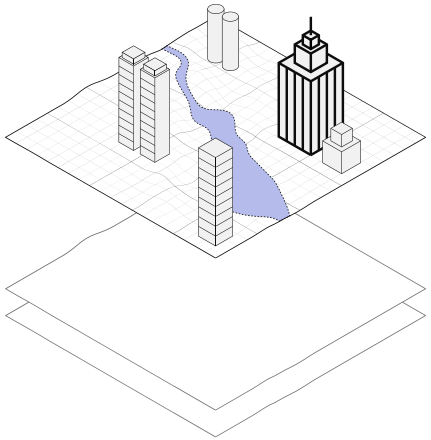
Hazard

Physical intensity for each location for each event

— A flood footprint represents flood depth for each grid cell for each event.

— Used to represent the varying impact and intensities of one event on different locations.



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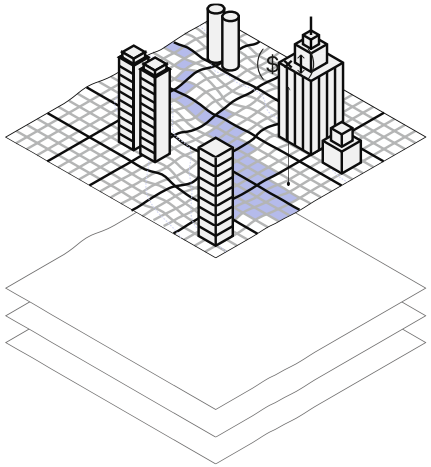
Exposure

Global asset value distributions

— Spatial distribution of asset values and building heights.

— For residential, commercial and industrial assets.



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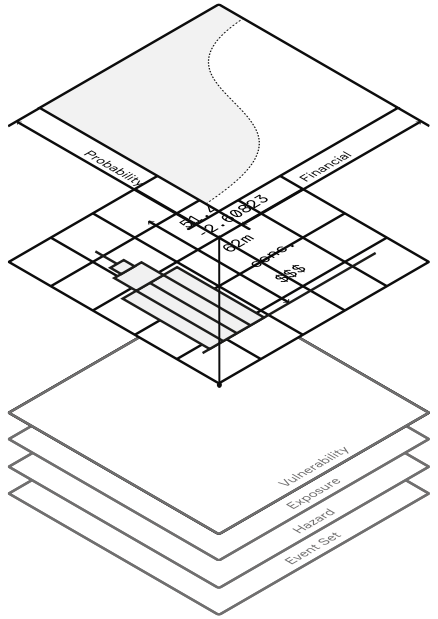
Vulnerability

Relating hazard to damage per asset type

— Links the hazard metric to a damage ratio.

— Quantifies the extent of damage to a building caused by an event, based on the characteristics expressed within the exposure dataset.



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Financial module

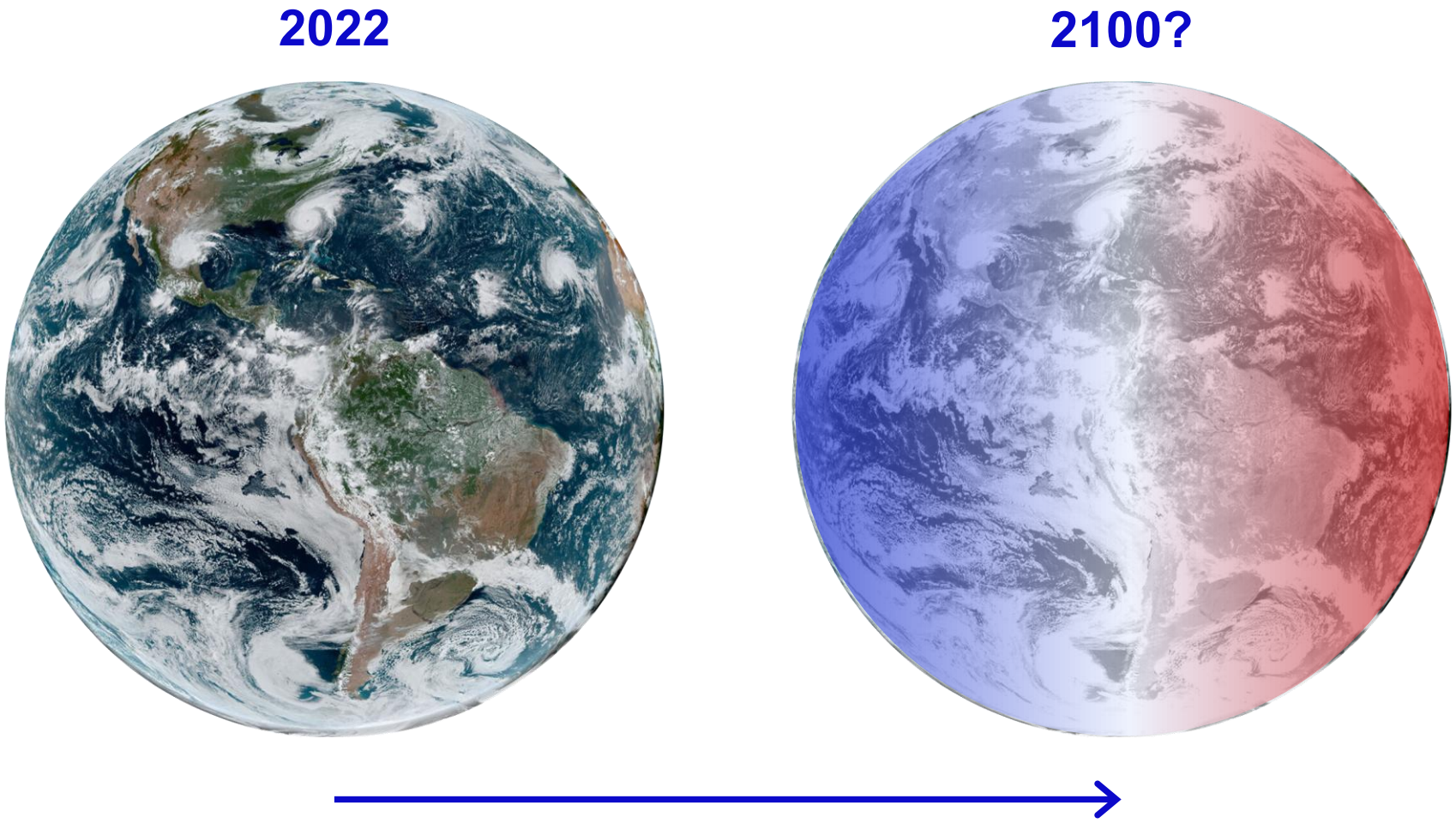
Calculating a range of loss metrics for different financial perspectives

— Calculates losses based on conditions provided by the user.

— Produces a loss table for every simulated event within each year for the user's portfolio. Metrics, such as loss exceedance probabilities and average annual loss can be calculated from this for different perspectives and output resolutions.

Climate change

- Global warming is already altering the Earth's climate, including extreme events.



But understanding future risk is extremely difficult, owing to the spatial complexity of flood risk and the mechanisms that drive it.

Future climate options

- Our Climate Dynamics framework allows a flexible range of climate options.
- Our default ‘current’ set of maps represents 2020.

Option	Range
Year	2011 - 2100
DeltaT	1°C – 5°C
Climate scenario	SSP1-1.9 SSP1-2.6 SSP2-4.5 SSP3-7.0 SSP5-8.5 RCP2.6 RCP4.5 RCP6.0 RCP8.5 NGFS scenarios
Uncertainty	17th, 50th and 83rd percentile as standard

Flood hazard maps for efficient site selection

EDF Renewables US

- Background: EDF Renewables, a leading player in the renewable energy sector, constantly seeks innovative solutions to enhance the efficiency and cost-effectiveness of their project development & site vulnerability assessment processes.

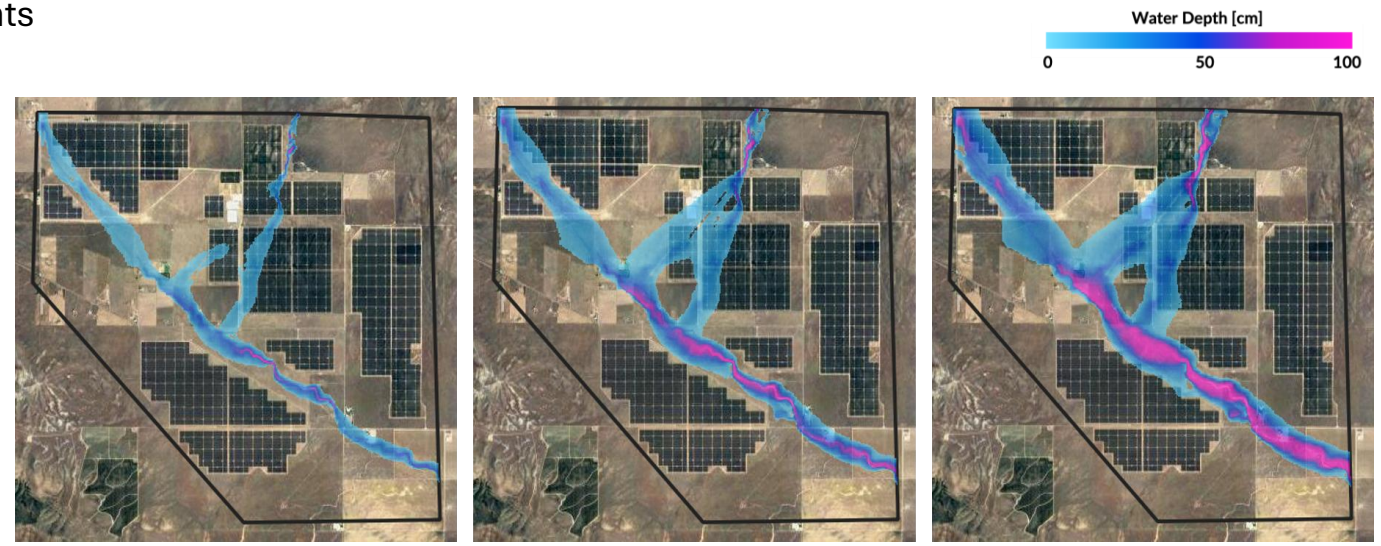
- Challenge: Traditionally, the development of renewable energy projects necessitated bespoke dedicated flood assessments for many potential sites. This process was time consuming, costly, and often delayed project timelines.

- Solution: The introduction of a Fathom's US Flood Map has revolutionized EDF Renewables' site selection process. This map provides a detailed overview of flood risks across various the US, enabling the EDF team to quickly assess potential sites without the need for individual flood assessments

Benefits:

- Time savings
- Cost reduction
- Enhanced project pipeline

Future: As EDF Renewables continues to refine and enhance their use of Fathom's US Flood Map, they anticipate further optimization of their site selection process.



Fluvial 1-in-10 year flood | Fluvial 1-in-100 year flood | Fluvial 1-in-1,000 year flood

Data centre vulnerability assessment

Microsoft

Background: Microsoft, a leading global IT organization, constantly seeks innovative solutions to reduce vulnerability of its data centres to the risks of climate change.

Challenge: Traditionally, establishing a consistent understanding of climate related flood risk for high value, dispersed assets required bespoke flood and climate assessments. This requires significant cost and time to achieve on a global scale.

Solution: The introduction of a Fathom's Global Flood Map, with full climate scenario coverage, has revolutionized Microsoft's understanding of data centre vulnerability. This map provides a detailed view of flood risk, anywhere in the world across multiple climate scenarios up to the year 2100.

Benefits:
Consistent view of risk now and in the future
Time savings
Cost reduction

Future: As Microsoft continues to expand its data centre portfolio it looks to combine Fathom data with additional physical risk datasets from Swiss Re (heat/wind etc).

Global flood hazard dataset integrated against data centre locations for multiple climate scenarios

Engineering climate resilience into the UK rail network

fathom.global

Network Rail, ARUP & Jacobs

- Background: Network Rail manages railway infrastructure across England, Scotland and Wales. The Weather Resilience and Climate Change Adaptation (WRCCA) strategy was set up to address this growing risk caused by increasingly severe weather events and build more climate resilience into the network.

- Challenge: Open-source data for England (EA), Scotland (SEPA) and Wales (NRW) use different flood modeling methods, and not all included future climate risk, resulting in inconsistent data across the countries.

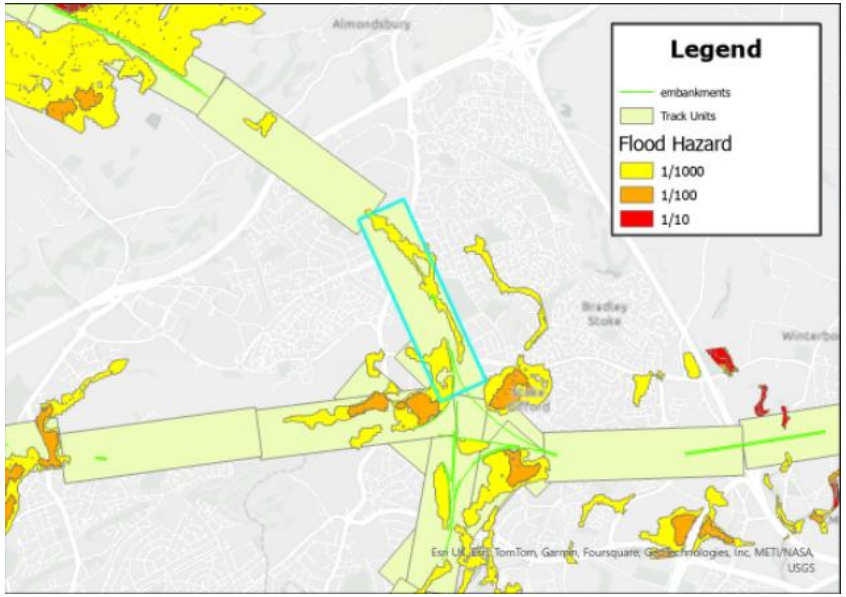
Solution: Fathom provided pluvial, fluvial and coastal flood data including bespoke climate scenarios and return periods. This data was integrated into Network Rail's methodology and asset data to create hazard indicators and flood hazard layers for the network, giving a consistent view of present and future flood risk.

Benefits:

- Consistent and detailed view of risk
- Time savings
- Cost reduction

Future:

With Fathom's data and Arup and Jacobs' methodology, Network Rail is developing a risk-mapping tool to identify asset risks and guide decisions on asset strategies and investment for climate adaptation.



Change Adaptation Pathways risk assessment tool

High-level outputs showing the combined climate risk assessments for each section of the network combined with Fathom's flood data to show flooding categorized by risk bandings

Statewide flood assessment

Virginia Department of Conservation and Recreation

Background: The Virginia Department of Conservation and Recreation, in partnership with Arcadis, was tasked with the development of a statewide flood management master plan. Only 3% of Virginians have flood insurance despite the increasing risk to homeowners.

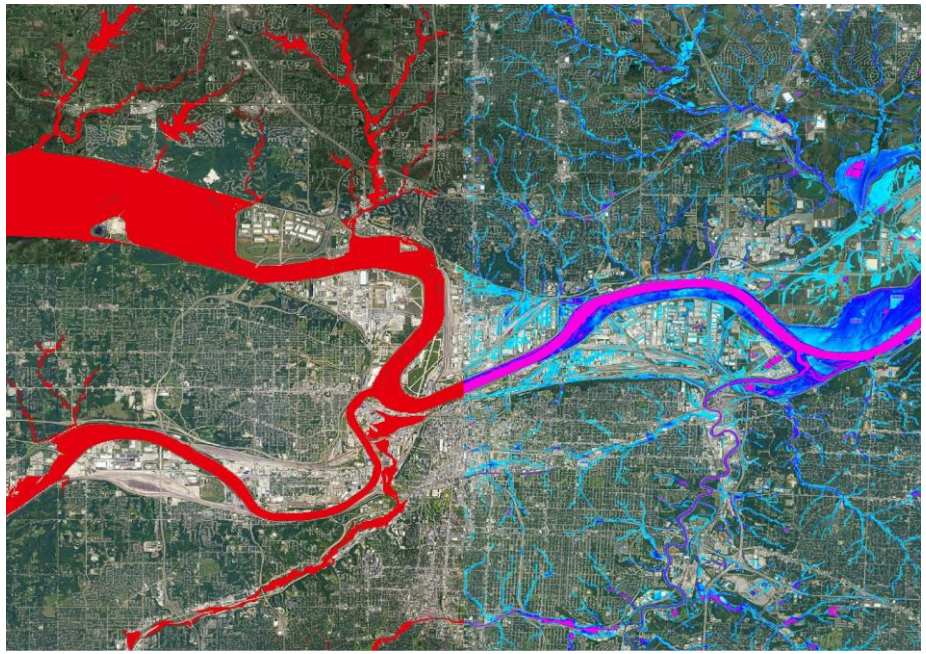
Challenge: In lieu of a comprehensive consistent view of flood risk across the state VDCR had to innovate. Traditional methods for modelling flood risk were cost and time-prohibitive, which would result in the delay of critical mitigation measures being implemented.

Solution: Fathom delivered current and future flood hazard and terrain data for Virginia. Covering pluvial, fluvial and coastal perils for current and future climate scenarios, this dataset underpins the engineering assessments and advisory services which Arcadis deliver for the VFPMP.

Benefits:

- Consistent view of risk now and in the future
- Time savings
- Cost reduction

Future: The VFPMP will set in stone evidence-based mitigation measures and powerful communication tools to support public adoption of insurance.



Example of Fathom fluvial event (right) compared to existing publicly available fluvial event from FEMA (left) in the US

• Emergency management Australian government

Geoscience Australia & Australian Government agencies

Background: The 2019-20 Black Summer bushfire events and 2022-23 Australian east coast flooding events highlighted the increasingly multi-jurisdictional nature of hazards and their impact.

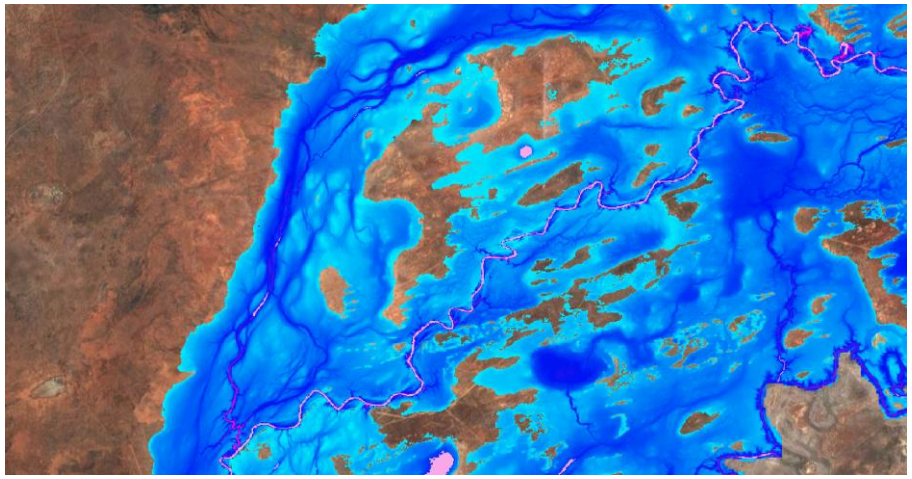
Challenge: Broadly, gaps currently exist at the Commonwealth level in terms of access to multi-hazard intelligence services to inform agencies of the extent and impacts of disaster events.

Solution: Following a competitive selection process, Fathom was named a preferred supplier to the Australian Government, with other agencies able to access the flood risk intelligence via Geoscience Australia's four-year agreement with Fathom. Interested public sector parties can access nationwide data from Fathom's award-winning Global Flood Map, which offers a defended and undefended view of event extents across rainfall, river and coastal flooding.

Benefits:

- Efficient disaster management planning
- Time savings
- Cost reduction

Future: Geoscience intents to increase the scope of data review to include future climate scenarios and other perils to contribute to a comprehensive emergency planning programme.



Current climate scenario flood hazard dataset for fluvial 1-in-100 year event in Australia

Measuring the impact of nature-based solutions

ARUP & the World Bank

Background: Dar es Salaam, Tanzania's fast-growing coastal city, faces flooding, erosion and water scarcity. The World Bank engaged Arup to assess nature-based solutions for resilience, flood risk reduction and improved quality of life.

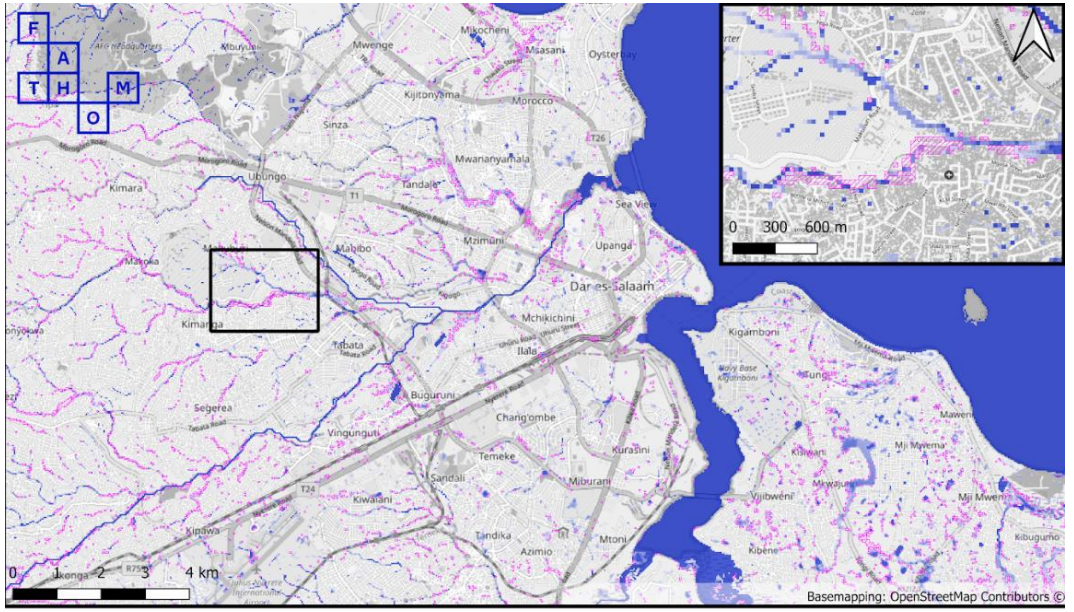
Challenge: Nature-based solutions like tree planting and rain gardens offer cost-effective flood management. However, their impacts are rarely quantified. Arup partnered with Fathom to demonstrate how greening interventions reduce flooding.

Solution: Fathom ran its 30m Global Flood Map with Arup's urbanization and NBS data to model present and future flood risk in Dar es Salaam. This rapid, machine learning–driven approach assessed scenarios with and without NBS, delivering results in days.

Benefits:

- Consistent view of risk now and in the future
- Time savings
- Cost reduction

Future: Arup and Fathom showed data-driven nature-based solutions in Dar es Salaam reduce flood risk, absorb rainfall, lower urban heat and limit soil loss—supporting faster, informed planning for climate-resilient infrastructure.



Dar es Salaam future flood assessment
Return period: 1-in-20 year flood
Scenario: Future climate and urbanisation with Nature-Based Solutions implemented

Key

Flood depth
0.5m +
0.0m

Areas protected from flooding due to implementation of Nature-Based Solutions

Data-driven, nature-based interventions could make 17,000 buildings less flood-prone, absorb 730,000 m^3 of rainfall, reduce urban heat by 1–5 °C and cut soil loss by ~4%.

Statewide climate conditioned flood hazard assessment

fathom.global

Florida Department of Environmental Protection

Background: The Resilient Florida Program, within the Office of Resilience and Coastal Protection of the Florida Department of Environmental Protection (FDEP), was tasked with the development of a comprehensive statewide flood vulnerability and sea level rise assessment.

Challenge: The work to identify and map the critical assets across the state had been completed last year however the FDEP did not have access to a consistent view of flood risk across the state which incorporated flood risk under future climate scenarios.

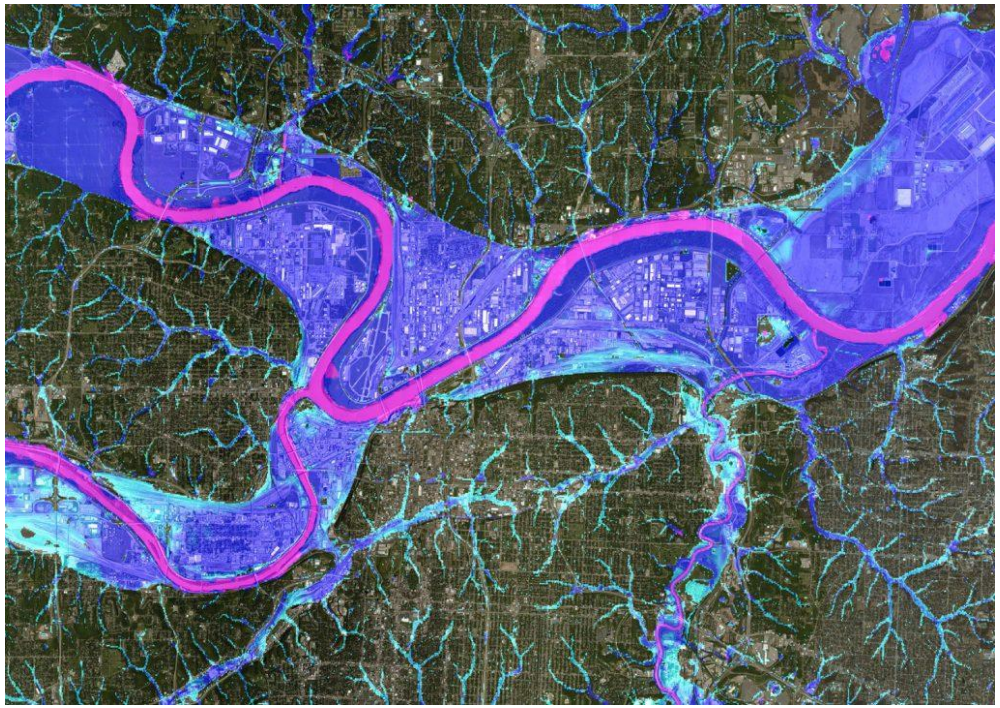
Solution: Fathom, in partnership two local engineering companies Taylor Engineering and Jones Edmunds scoped the project and developed a new bespoke country-wide flood map. The data is being used to; A) Reduce financial and physical vulnerability to flooding across the country, B) Development of a statewide flood insurance program, C) Create a national action plan and Raise public awareness of flood risk

Benefits:

- Time savings
- Cost reduction
- Improved investment planning

Future: Project partners continue to collaborate with FDEP and project partners to enhance the current and future view of flood risk across Florida.

Find out more



Example of the fluvial flood profile from statewide flood hazard map showing extents and depths for current climate scenario

The first statewide flood mapping programme

Texas Water Development Board

- Background: In 2019, the Texas Legislature tasked the Texas Water Development Board (TWDB) with delivering the first-ever statewide flood plan for the state of Texas.

- Challenge: There were gaps in the publicly available data as approximately 60+ counties (63% of state) did not have any existing flood maps. The estimated cost of developing BLE for the state using traditional means was $45M.

- Solution: Fathom developed a bespoke 3m resolution terrain model for Texas and generated a state-wide flood hazard map for pluvial, fluvial and coastal flood hazards. This was integrated into a Flood Hazard Hub for the state, containing additional critical built and natural environment data layers to support multi-agency collaboration and public communication.
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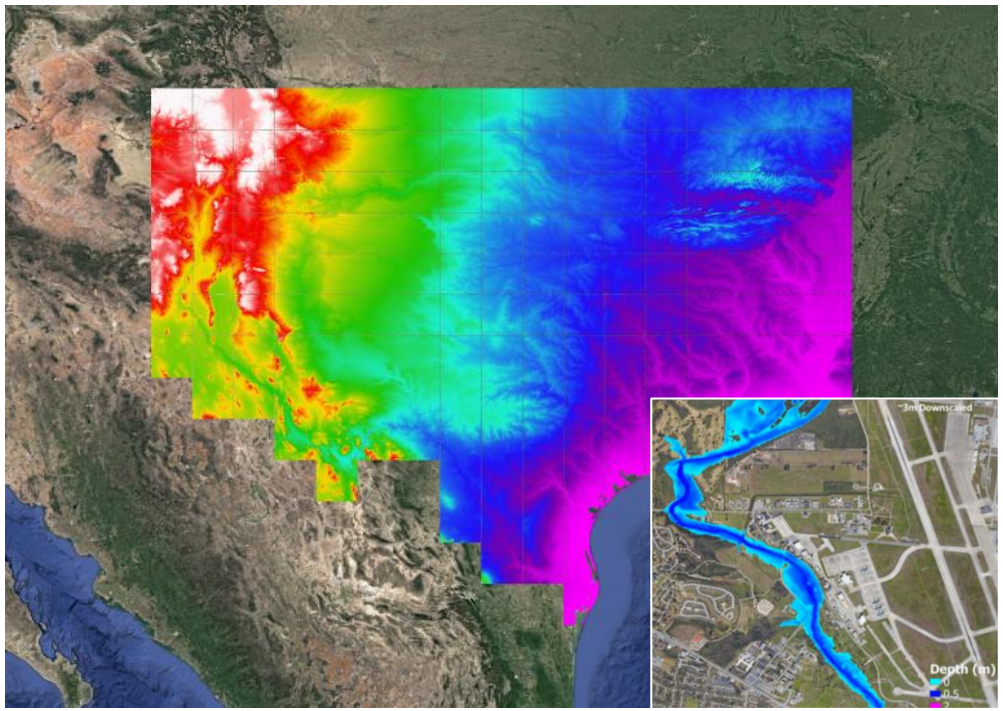
Benefits:

- Time savings
- Cost reduction
- Improved investment planning

- Future: Texas and Fathom are now generating statewide flood hazard map data for future climate scenarios to improve long-term investment planning.

Find out more



Texas terrain elevation map with inset of local fluvial 1 in 100 flood

National climate conditioned flood hazard assessment

Public Safety Canada and Aon Impact Forecasting

Background: With the frequency and severity of these natural disasters expected to increase under climate change, Public Safety Canada initiated an open procurement process to license flood hazard information for all of Canada.

Challenge: Flooding is the most common and costly natural hazard in Canada, causing billions in direct damage to dwellings, property and infrastructure, and affecting thousands of Canadians each year. However, there is no current consistent, climate conditioned dataset of flood hazard for Canada.

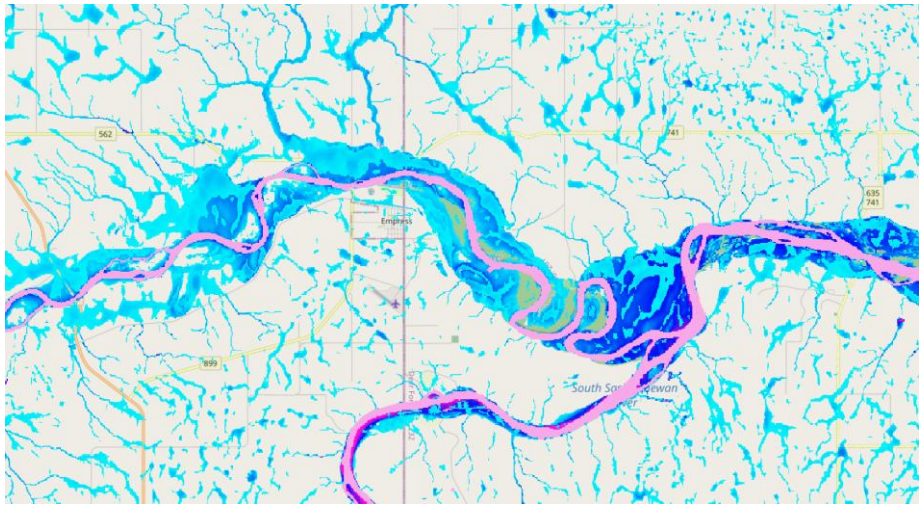
Solution: Led by Fathom, the combined team will provide the Government of Canada with a flood hazard dataset that depicts flood extents and depths for several return periods, flood generating mechanisms and climate change scenarios.

Benefits:

- Consistent view of risk now and in the future
- Time savings
- Cost reduction

Future: Public Safety Canada will use this information to inform a variety of public initiatives to protect the natural and built environment, including policy, digital awareness tools and investment plans.

Find out more



Example of Fathom fluvial and pluvial 1-in-100 year flood for Canada, east of Calgary

• Epidemiology research in Africa

The Kids Research Institute Australia – Malaria Atlas Project

Background: The Malaria Atlas Project is investigating the impact of flooding and climate change on malaria control in Africa including transport infrastructure, disruption to malaria control efforts and the evolution of mosquito breeding-site distribution.

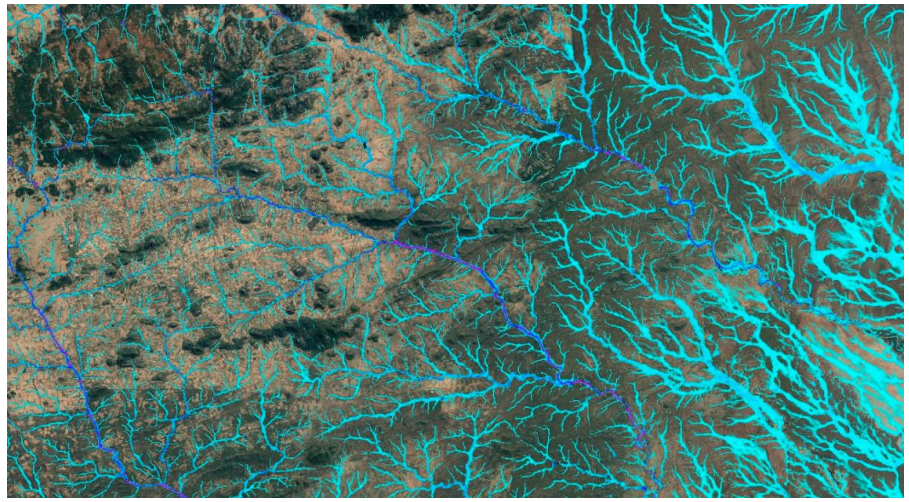
Challenge: With little climate conditioned flood hazard data available for Africa, the cost and time constraints were becoming prohibitive. A consistent view using up-to-date data is critical to establishing evidence-based continent-wide mitigation strategies.

Solution: The introduction of Fathom's Global Flood Map, with full climate scenario coverage, has enabled rapid analysis of multiple current and future flooding scenarios. The data has been integrated with infrastructure and epidemiological datasets across Africa to derive concrete evidence of impacts, and prioritization of where to implement mitigations.

Benefits:

- Consistent view of risk now and in the future
- Time savings
- Cost reduction

Future: AsThe Kids Research Institute Australia continues to develop solutions to the problem additional datasets will be integrated into the GIS system to derive further solutions.
Read more



Global flood hazard dataset for fluvial 1-in-100 year event in 2030, Zimbabwe

Access

Fathom API

- Fathom-hosted API
- Full flexibility of climate options
- No need to host large data

Fathom Portal

- Fathom's new interactive platform
- Allows users to host, view and analyze data, without the need for an in-house platform

Direct provision

- Data provided as a set of GeoTIFF files
- Useful where API integration is not feasible
- Climate options need to be pre-defined
- Large data volumes – multiple TB

Partners

- Access via third-party platforms
- Quick adoption if already using partner system

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Explore Fathom's Product Stack

https://www.fathom.global/product-stack

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