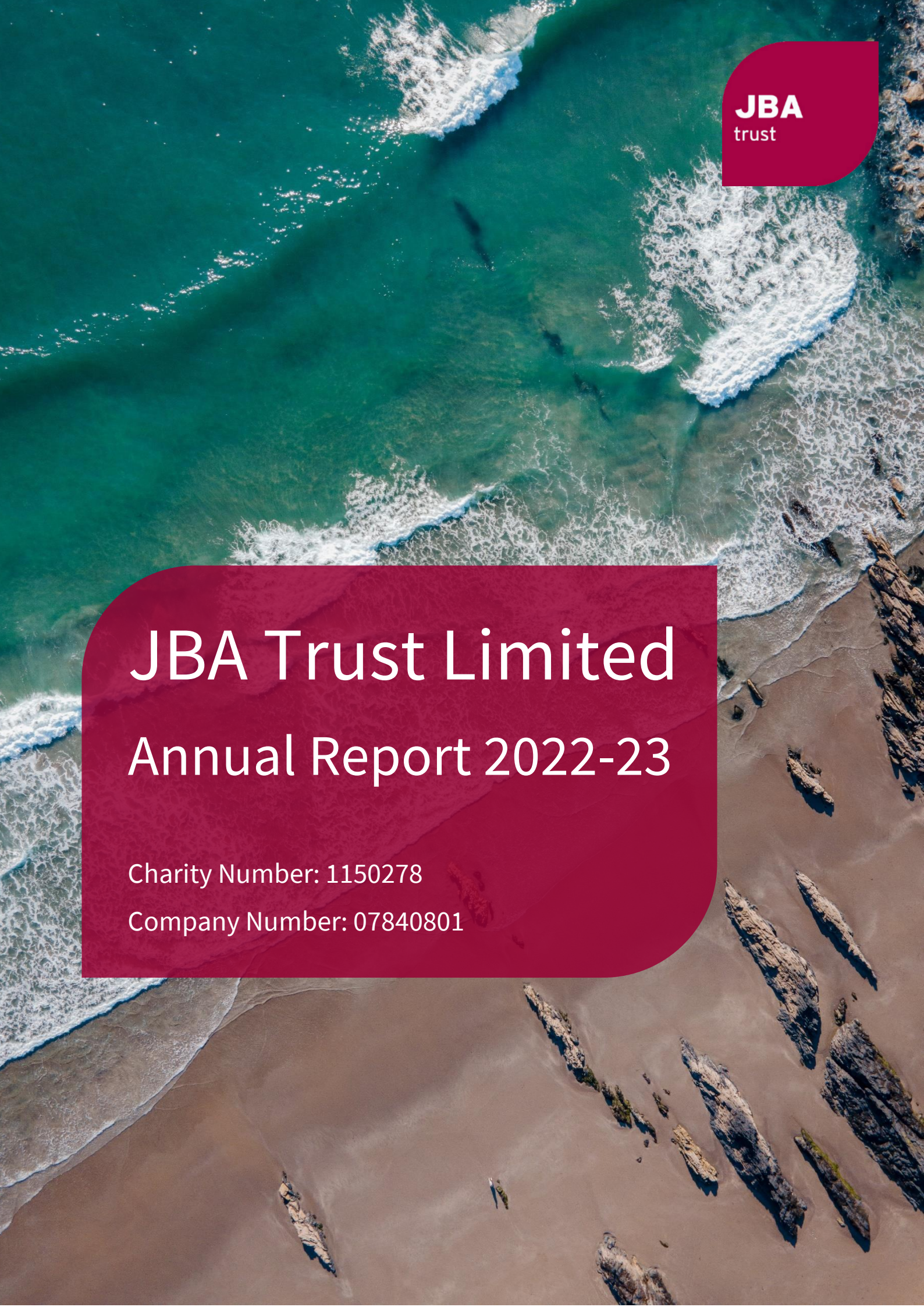


JBA Trust Limited

Annual Report 2022-23

Charity Number: 1150278

Company Number: 07840801

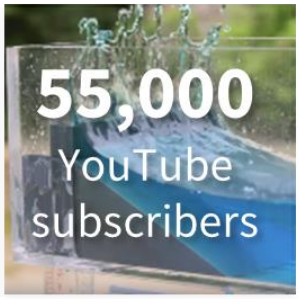
Highlights of JBA Trust's charitable activities

7
Studentship Awards

STEM
outreach & engagement

11
PhDs
supported

Research internship
on Natural Flood Management



2
Scholarships
in Flood & Coastal Risk Management

Cover photo credit: Daniel Morris, Unsplash

Director's Report

I am delighted to present the annual report for our financial year November 2022 to October 2023. The JBA Trust has continued to offer valuable support for the creation, sharing and application of knowledge about risks and resilience around the water cycle.

This year we have renewed many partnerships and created new ones. We prioritised engagement activities that involve working in depth with others to achieve change and connect with groups relatively under-represented in sectors and disciplines most relevant to our work. Interest in our physical demonstration models and supporting resources continues to grow, with the demand exceeding our capacity. So we have begun to establish a community of practice around the demonstration models by mapping the network of people and organisations who have built similar models, used our designs or developed similar expertise independently.

Our support for research spread over many projects. This year we helped 11 doctoral researchers and 10 people undertaking other postgraduate studies.

Seven peer-reviewed scientific publications were produced from research we supported. We also dedicated significant time to help our network of academic partners secure new funding for research and training across a range of scientific and technical disciplines. In total, we worked with more than 10 university groups to lend support to their proposals for doctoral training or research funds.

As a corporate foundation, most of our resources are donated by our sponsors, the JBA Group of companies. We have now facilitated more than 36,000 hours of work by JBA colleagues to help share their knowledge and expertise. On behalf of the trustees I thank those colleagues and the many partners with whom we have worked collaboratively, helping us to deliver on our charitable objectives.

Rob Lamb, Managing Director

Contents

1 Our purpose and activities

JBA Trust is a charity established and funded by the JBA Group of companies. We aim to help improve people's resilience to environmental risks by sharing knowledge. We do this by enabling research, education and engagement.

We work with academic researchers, NGOs, charities and the JBA Group of companies in four key areas:

- Facilitating collaboration between academia and industry to deliver high quality scientific research.
- Publishing and disseminating knowledge, enabling shared understanding and good practice.
- Supporting post-graduate training by providing technical expertise and financial bursaries for MSc and PhD studentships.
- Engaging with schools, charities and voluntary groups to share inspiration and learning resources.

This annual report reviews the activities of the JBA Trust over the past year and how our work has delivered public benefit.

2 Science and research

We facilitate collaboration between academia and industry to deliver high quality scientific research. By publishing and communicating research outputs, we enable knowledge exchange and share best practice.

Collaborative research

In 2022-23 we worked with universities, research institutions, public sector and charitable organisations. The highlights and outputs of our collaborative research projects are summarised below.

Support for Centres for Doctoral Training (CDTs)

In 2022, the UK government announced significant new investment in the provision of high quality, cohort-based doctoral education through Centres for Doctoral Training (CDTs).

The Engineering and Physical Sciences Research Council (EPSRC) is committing up to £324 million to support approximately 40 CDTs across the engineering and physical science landscape. The Natural Environment Research Council (NERC) is committing over £10 million to support four CDTs to tackle the most challenging environmental science issues including flood management and freshwater quality.

We worked closely with university partners to support the co-development of centres that focus on the themes of flood and climate resilience, uncertainty and risk, and the underpinning data science that supports evidence-led decision making. As well as helping to identify knowledge gaps and needs within these themes, we aim to support the successful CDTs through PhD sponsorship and placement provision.

UK Flood Hydrology Roadmap

The flood hydrology roadmap is a 25-year vision and plan to advance all aspects of flood hydrology in the United Kingdom. It was developed with inputs from more than 270 individuals from 50 organisations working in hydrology, flood management and related topics.

We have supported the roadmap project since it started in 2018 through membership of its steering group and by contributing to publications and presentations. This year, as delivery of the roadmap picked up pace, we have supported it by:

- chairing the newly-formed roadmap Science and Technical Advisory Group, which met for the first time in January 2023 and three more times over the reporting year
- providing support to the roadmap's governance board on behalf of the advisory group
- delivering a joint CIWEM/British Hydrological Society webinar about the roadmap, part of the CIWEM Flood Resilience series, on 21 June 2023

Research outputs	Type	Link
Flood Hydrology Roadmap update	Webinar	https://www.youtube.com/watch?v=iJiRI4O6r4Y

Abrupt Wave Front floods

'Abrupt wave front' floods (AWF), also known as flash floods, describe an extremely rapid rate of rise in water level and discharge. They are a significant hazard to river users and are caused by extreme rainfall events on steep upland catchments which can then move downstream for tens of kilometres.

The characteristics and downstream transmission of AWF floods are described and analysed in a paper published in Hydrology Research by Samuel Watkiss and David Archer. The paper combines research undertaken by Sam whilst at the University of Leeds, and work by David Archer. We supported Sam for part of his placement year and dissertation.

Historical data for events in Pennine catchments in northern England were extracted from the British Chronology of Flash Floods, a freely available resource hosted by JBA Trust.

Research outputs	Type	Link
The characteristics of 'abrupt wave front' floods on Pennine catchments and their transmission downstream	Journal paper	https://doi.org/10.2166/nh.2023.126

Wet Canopy Evaporation

This research is a collaboration with the Fluid Dynamics Centre for Doctoral Training (CDT) at the University of Leeds, with input from Barry Hankin at JBA Consulting and the NERC Q-NFM project team at Lancaster Environment Centre.

We supported a team of MRes students in the Fluid Dynamics CDT to investigate the plausibility of high rates of wet canopy evaporation during heavy rainfall events and possible implications for tree planting as a type of natural flood management. The MRes team developed an outreach demonstrator model to help explain the concepts in the project.

Retention time tool

One of the strategies for natural flood management in the UK is the use of in-stream barriers to retain water during flood events. We have published and updated a web page containing a spreadsheet tool to link leaky barrier structural design to backwater volume and increase in retention time, allowing exploration of the impact of varying barrier and channel structural parameters during the design phase or for the post-hoc evaluation of existing barriers.

The tool was developed by Elizabeth Follett, Royal Academy of Engineering Research Fellow at Liverpool University, and our trustee Keith Beven.

Research outputs	Type	Link
Leaky barrier retention time tool	Spreadsheet and webpage	Leaky barrier retention times for Natural Flood Management interventions

Doctoral research projects

Our collaboration with universities across the UK enables us to support graduate researchers (research students) working on doctoral projects to develop advanced skills and deliver high quality research that helps enhance the understanding of a wide range of risks in the environment. We support doctoral researchers through a variety of programmes including doctoral training centres funded by UK Research and Innovation (UKRI).

This year, we were delighted to see another of our graduate researchers, Georgios Sarailidis, successfully complete his PhD.

Information about all our PhD projects can be found at: https://www.jbatrust.org/funding-and-support/early-career-researchers/

PhD project outputs

We are pleased to be able to share this year's outputs from the projects, including peer reviewed publications.

- Helen Hooker, studying at Reading University, published her first paper in the Journal of Hydrology on 'Analysis of 2D inundation patterns to identify skilful scales of comparison'. The paper is available at: https://doi.org/10.1016/j.jhydrol.2022.128170

  Helen also published an article on our website that aimed to make the academic concepts in her journal paper more accessible to a wider audience. The article discusses how earth observation data can identify flooded areas and is available here: Improving forecast flood maps using earth observation data : JBA Trust
- Luke Jenkins, studying at the University of Southampton, published his first paper in Natural Hazards on 'The temporal clustering of storm surge, wave height, and high sea level exceedances around the UK coastline'. The paper is available at: https://link.springer.com/article/10.1007/s11069-022-05617-z
- Jake Grainger, who has completed his PhD at Lancaster University, published a paper on how statistical approaches can help estimate directional ocean wave models. The paper is available at: https://doi.org/10.1093/jrsssc/qlad006
- Zora van Leeuwen, who has completed her PhD at the University of Leeds, published two papers on how leaky dams in upland catchments can affect flood hydrology. The papers are available at: https://doi.org/10.1016/j.jhydrol.2023.130448 and https://doi.org/10.1016/j.jhydrol.2023.130449

3 Research publications

During the year, we supported and co-authored studies published as papers in peer-reviewed scientific journals.

Title and link	Journal	Authors	Status
The temporal clustering of storm surge, wave height, and high sea level exceedances around the UK coastline	Natural Hazards	LJ Jenkins, ID Haigh, P Camus, D Pender, J Sansom, J, R Lamb & H Kassem.	Published
The characteristics of 'abrupt wave front' floods on Pennine catchments, northern England, and their transmission downstream	Hydrology Research	S Watkiss & D Archer.	Published
Using physical models to improve geographical learning	Teaching Geography	B Brady, K Suter, R Lamb & A Scott.	Published
A multivariate pseudo-likelihood approach to estimating directional ocean wave models	J. Royal Statistical Society Series C: Applied Statistics	JP Grainger, AM Sykulski, K Ewans, HF Hansen, P Jonathan	Published
Assessing the spatial spread–skill of ensemble flood maps with remote-sensing observations	Natural Hazards and Earth System Sciences	H Hooker, S Dance, D Mason, J Bevington & K Shelton.	Published
Quantifying the natural flood management potential of leaky dams in upland catchments, Part I: A data-based modelling approach	Journal of Hydrology	Z.R. van Leeuwen, M.J. Klaar, M.W. Smith, L. Brown	Accepted
Quantifying the natural flood management potential of leaky dams in upland catchments, Part II: Leaky dam impacts on flood peak magnitude	Journal of Hydrology	Z.R. van Leeuwen, M.J. Klaar, M.W. Smith, L. Brown	Accepted

4 Support for students in higher education

There are many academic subjects that generate the knowledge and understanding needed to manage risks in our environment. Whilst undergraduate courses such as Geography and Environmental or Physical Sciences are important, the relevant specialist training often comes into greater focus at postgraduate (PGCert, Masters or doctoral) level. We therefore emphasise support for students and projects at this level.

The British Hydrological Society, JBA Trust and Environment Agency Studentship Awards

In 2022-23 we continued our partnership established in 2011 with the British Hydrological Society (BHS) and the Environment Agency to support students working towards MSc (or equivalent level) qualifications in hydrology, water resources, catchment management and other related subjects. We awarded bursaries of £2,500 and have now made awards to 107 students at 25 different UK universities since 2011.

We also asked recipients of the bursaries about what difference the awards had made:

"The award definitely made postgraduate education more accessible to me."

"I wouldn't have been able to do my MSc without your financial support and wouldn't be where I am today without it – to this day your support means a lot!"

"Without this Scholarship, I would not have been able to complete my course."

"It allowed me to go to my first-choice university."

Applications for these bursaries were managed using the web-based system that we developed in 2014 and have maintained since. This continued to work well and enabled us to coordinate the assessment process with the BHS and Environment Agency effectively.

We continue to collect information on equality, diversity and inclusion (EDI) as part of the application process. The aim is to build an understanding of the diversity of recipients, alongside the partners' ambitions to ensure that the awards are inclusive.

Flood and Coastal Risk Management Scholarships

The challenges of more frequent extreme weather and new flood risk responsibilities mean that there is a growing need for skilled water and environmental risk management professionals. This year we continued our support by funding two scholarships for Lancaster University's Flood and Coastal Risk Management Postgraduate Certificate course.

> *"Working for The Rivers Trust, I'm involved in projects across the country looking to implement natural flood management at scale. I chose to apply for the course to enhance my understanding of flood and coastal risk management.*
>
> *Thanks to the support of JBA Trust, I can study whilst still being able to work on these projects. I hope to apply what I learn during the course through my work with the Rivers Trust Movement, taking an evidence-based approach to mitigating flood risk and improving the health and resilience of our catchments.*
>
> *The course will help towards achieving our shared goals, offering the opportunity to combine theory with practical application for the benefit of communities and catchments alike."*
>
> - Tom Gall, 2023 PGCert Scholarship recipient

Masters projects

We help to provide MSc (or equivalent degree level) students with placements, technical expertise and access to software resources and case study data, as well as offering a platform for them to share highlights from their research projects. The students we help have gained insight into how methodologies and techniques are applied in industry and have an opportunity to see how they will be able to use their skills in a future career.

In 2022-23, we supported George Williams, who was studying Sustainability and Consultancy at the University of Leeds. George's research aimed to improve understanding of the number and location of culverts that may be acting as a barrier to fish passage. With our help as a facilitator, George also supported Ben Bluck's PhD research at Southampton, providing benefit to both students.

Summer Internship

This summer we hosted Katie Russell, an Environmental Sciences MSc student, for a 5-week internship to develop a comprehensive database that shares spatial information about published academic research on Natural Flood Management (NFM) or coastal nature-based solutions. Katie processed a database of 791 journal papers and technical reports, published between 2017 and 2023, and extracted location data, metrics of scale and research meta-data from each paper.

We aim to make this available as an online mapping resource to help practitioners and the academic community to easily identify and visualise the locations (e.g. river catchments, field sites) where data and published research are available.

5 Learning and engagement

We support a wide range of activities aimed at encouraging students at schools and universities to develop or enhance their interests in water and environmental management, which could also ultimately lead them to pursue careers in the field. Our learning and engagement activities also extend to the wider community, and to flood risk management professionals.

In 2022-23, we worked with many different organisations to develop learning resources and deliver activities to support engagement and education.

Public engagement in resilience and flood risk

This year, we chose to develop partnerships with organisations that have strong relationships with local communities or have a well-established outreach and engagement track record. This approach helped us target our resources more effectively and enabled us to reach more diverse communities.

We supported the **Rochdale Science Extravaganza** in March 2023, a free event that provided a wide range of science, technology, engineering, art and maths (STEAM) activities for the whole community. Organised by the Rochdale Science Initiative and Bangladesh Association and Community Project (BACP), the theme of 'Climate Change and Sustainability' brought together scientists, researchers, artists and others with an aim of inspiring and encouraging people to explore science and to consider their part in creating a sustainable future. Over 1,460 people attended the event, and visitors used our augmented reality sandbox to explore flood risk and see how climate change might affect flooding in future.

We also supported the **London Science Museum 'Science on a Sphere'** exhibition this summer in partnership with volunteers from the Environment Agency. Our volunteers used our augmented reality sandbox to explore climate change, resilience and flood risk. During the 20-day exhibition the museum welcomed 227,354 visitors. Over 6,400 people engaged

with the volunteers, activities and demonstrations, and 78% of the people who left feedback will take action on flood risk or climate change based on their experience at the exhibition.

Supporting STEM in schools

This year, we worked with the Transpennine STEM Ambassador Hub on a STEM Interventions project that enabled us to build a programme of engagement with **Carlton School in Keighley**, a local school that had identified the need for additional STEM support. The STEM Ambassador network funded training for our volunteers, delivered by the Science Museum Group Academy, to help them develop session content relating to sustainability and climate change for Key Stage 3 students.

We delivered a full day of careers and coastal risk management sessions to over 200 geography students at **St Ambrose Barlow RC High School in Salford**. Our volunteers talked to Year 9 students about careers in flood risk management and demonstrated the wave tank to show how effective different types and combinations of coastal defences are at preventing overtopping and flood risk.

As part of a 'Water Risks' themed day at **Ermysted's Grammar School in Skipton**, we worked with the University of Nottingham and North Yorkshire Fire and Rescue Service to deliver interactive sessions about water and flood risk management. The Year 8 students used our hands-on physical models (the PARM, wave tank and river flume) to understand how water behaves in the environment and how to stay safe in and around rivers.

Industrial Cadets

In July 2023 we hosted 31 Industrial Cadets who joined us as part of a week of STEM related work experience with Yorkshire Water. We hosted the group with JBA Consulting at their Saltaire offices and explored flood risk, water safety, fish passage, river engineering and environmental engineering and sustainability careers as well as visiting Salts Mill weir fish pass.

Water safety

Since we partnered with North Yorkshire Fire and Rescue Service and Hydrotec to build a specific water safety flume in 2022, we have helped other fire services and water safety charities to source or create their own water safety flumes. So far, we have shared our designs and learning resources with fire and rescue teams in Leicestershire, London, West Yorkshire, South Yorkshire, Cheshire, North Cumbria, Surrey, Tees, Lancashire, Greater Manchester, Bury, Oregon and Richmond, USA.

In October 2023, we offered our Big River Flume to the London Fire Brigade to be used to demonstrate water safety in a proposed new 'Water Safety Centre of Excellence' based in Twickenham in partnership with the RNLI.

CityZen

We worked with the Institute of Civil Engineering's Engagement and Inspiration Team again this year to support the CityZen competition by joining the panel of judges. CityZen focuses on developing the infrastructure for a town within the context of climate change, flood risk and sustainability. The game helps engage students aged 16–18 with civil engineering, as well as helping develop important skills for work and study, such as problem-solving, teamwork, critical thinking and communication. The final award is based on a video submission by the teams. This year, more than 190 schools took part, with the awards being announced in March 2024.

Digital learning resources

Our digital learning resources have elements of engineering, maths and geography included in each topic in the context of flood risk, water management, weather and climate. They are packaged by age group and include videos, worksheet activities, case studies and exercises.

All our learning resources can be accessed and downloaded at: www.jbatrust.org/learning-resources/.

Sharing experience

This year we published a paper on 'Using physical models to improve geographical learning' in the Teaching Geography journal to highlight how teachers could incorporate physical model into their practice.

Physical models

Our physical models of catchments, rivers and coasts enable us to bring to life topics including flood risk, coastal and river engineering and nature-based solutions.

Our collection includes four different sized hydraulic river flumes, four wave tanks, an augmented reality sandbox and a Projection Augmented Relief Model (PARM).

6 Building our reach and enabling knowledge exchange

Digital engagement

Our website (www.jbatrust.org) enables people to easily access all our publications and educational resources, as well as find information about JBA Trust and our research projects. It continues to help us deliver our charitable objectives of sharing best practice and supporting engagement and education.

In 2022-23 we received 105 direct enquiries about research support, our physical models, bursaries and scholarships and support for educational activities and events.

JBA Trust's YouTube channel hosts all our video resources and we now have over 54,000 subscribers. Across all social media platforms, our videos have received over 35 million views.

We also use Twitter and LinkedIn to publicise research outputs, new resources, publications or scholarships and awards.

Global reach

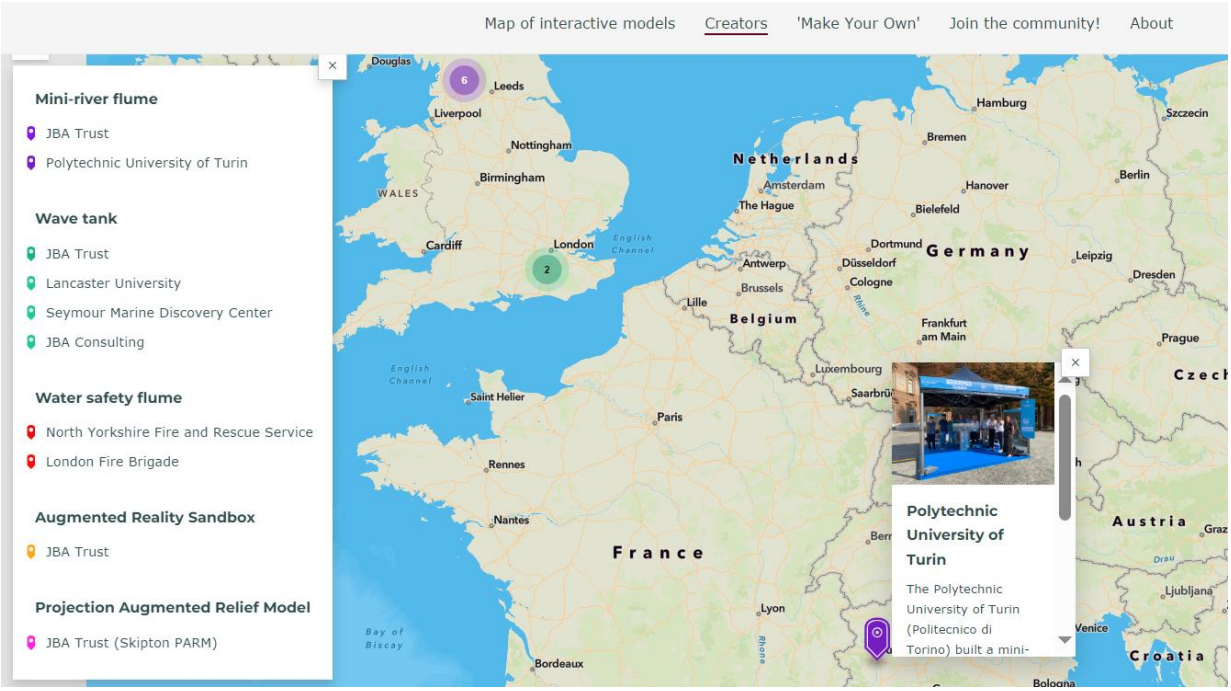
This year we responded to over 66 requests from around the world for support and assistance from people who, having seen our physical model and weather station resources, would like to build their own or set up their own educational project. The contacts came through social media or our website contact pages.

By sharing factsheets and detailed specifications for our models, we aim to enable people to create their own educational resources to support their communities and raise awareness of flood risk management. In some cases, we have established an on-going dialogue with people who have approached us to help them with their own projects. We have helped high school and college students, university researchers, teachers and private individuals.

Interactive models: Community of Practice

We are developing an online map to support a ‘Community of Practice’ for people who use physical models of water to support education and engagement. The maps show where and how interactive models are being used across the globe and are designed to help the community share ideas, knowledge and inspiration to support education and outreach activities.

The interactive map is available to view here: https://arcg.is/fbDf80



7 Structure, governance and management

JBA Trust is a company limited by guarantee and is governed by its Memorandum and Articles of Association. It was incorporated on 9 November 2011.

Directors and trustees

We were delighted to welcome two new trustees, Joanne Coles and Peter Jimack, to our board in September 2023. The Trustees serving during the year were as follows:

Trustees	Rob Lamb, JBA (Managing Director of JBA Trust)
	Jeremy Benn, JBA
	Jim Hall, Oxford University
	Keith Beven, Lancaster University (emeritus)
	Nick Russell, Independent financial consultant
	Joanne Coles, Environment Agency
	Peter Jimack, University of Leeds
Secretary	Craig Robson

Governance

The trustees review the activities of JBA Trust every six months to ensure that they are focused on supporting the purpose of the charity. The review also considers the strategic direction of the charity and considers how planned activities will contribute to public benefit.

We have referred to the guidance contained in the Charity Commission's general guidance on public benefit when reviewing our aims and objectives and in planning our future activities.

Appointment of trustees

On incorporation of the JBA Trust, the Board of Trustees was appointed by invitation.

To preserve independence of the JBA Trust from JBA Group companies, which provide part of its core funding, the JBA Trust's Articles of Association stipulate that the number of trustees connected to or employed by JBA Group shall always be less than half of the total number of trustees appointed at any given time.

The trustees are not remunerated (other than payment to cover travel and accommodation costs where required for JBA Trust business).

Trustee induction and training

Periodically, the trustees meet and are briefed on their legal obligations under charity and company law, updates to the Charity Commission's guidance on public benefit, the content of the Memorandum and Articles of Association and the JBA Trust business plan.

Organisation

The Board of Trustees meets every six months and is responsible for the strategic direction and policy of the charity. A Managing Director is appointed by the trustees to manage the day-to day operations of the charity and is supported by a Programme Manager.

Risk management

The trustees have a risk management strategy which comprises:

- An annual review of the risks the charity may face
- Policies and procedures in place to mitigate those risks
- Plans in place to minimise the impact of the risks should they materialise.

The principal risk to JBA Trust is financial sustainability. This is mitigated by having a robust reserves policy and a clear financial plan which is reviewed and subsequently approved by the trustees at the start of the financial year.

JBA Trust adopts policies and procedures from our host, the JBA Group, which are externally validated where applicable. These include policies on: Health and Safety; Energy Use; Environment; Sustainability; Social Responsibility; Equality and Diversity.

Association of Charitable Foundations

As a member of the Association of Charitable Foundations (ACF), we support their vision of diverse, vibrant and effective foundations, working together for social good. We utilise the ACF's Stronger Foundations Initiative resources, in particular the '10 pillars of stronger practice for smaller foundations', to inform our strategy and help enhance our effectiveness.

8 Financial review

The principal funding source for JBA Trust is JBA Group dividends. JBA Trust also aims to leverage funding for research projects by supporting partners in applying for funding from external organisations, for example UK Research and Innovation (UKRI) grants awarded to university partners for PhD studentships. We also generate a small amount of additional income from hiring out our physical models for use by commercial organisations. Personal donations are processed through an online giving platform that enables Gift Aid to be claimed efficiently.

Reserves Policy

Reserves are required to minimise the financial risks associated with the unlikely event of unplanned or unforeseen expenditure. The JBA Trust maintains sufficient reserves to cover all contractually committed expenditure or liabilities and operating costs for one year.

Plan for future periods

JBA Trust anticipates continued long-term funding from JBA Group. To ensure that the charity maximises the value of its income in carrying out its activities, the strategic plan focuses on continuing to seek match funding for research projects from funding bodies, including Universities and Research Councils. In the future JBA Trust may also wish to generate an income by licensing datasets, results or models generated by research.

The trustees declare that they have approved the Trustees Report above.

On behalf of the trustees

Rob Lamb, Managing Director of JBA Trust 1 March 2024