Alternative ways of confronting urban flooding: The Waterproofing Data project

Workshop on UK-Brazil collaboration for investigating the nexus between water, health and urban resilience – 29/04/2019

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Lecture Overview

- Why is flood resilience important?
- Traditional vs alternative ways of flood risk management.
- The Waterproofing Data project.
- Critically pedagogical co-production approach.

Flooding and urban environments

- Cities are particularly vulnerable to floods.
- Fluvial and pluvial flooding are the most common types threatening cities.
- Climate change exacerbates urban flooding phenomena.
- Informal settlements increase exposure to floods.

Why does flood resilience matter?

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- Improving the resilience of cities to floods and other natural hazards has been recognised as a requirement for sustainable urban development in the Sustainable Development Goal (SDG) 11 of the United Nations.
- Flood related disasters between 2008-2011 resulted in approx. 3.8 bn $ costs.
- Poor communities are more vulnerable to water-disasters.

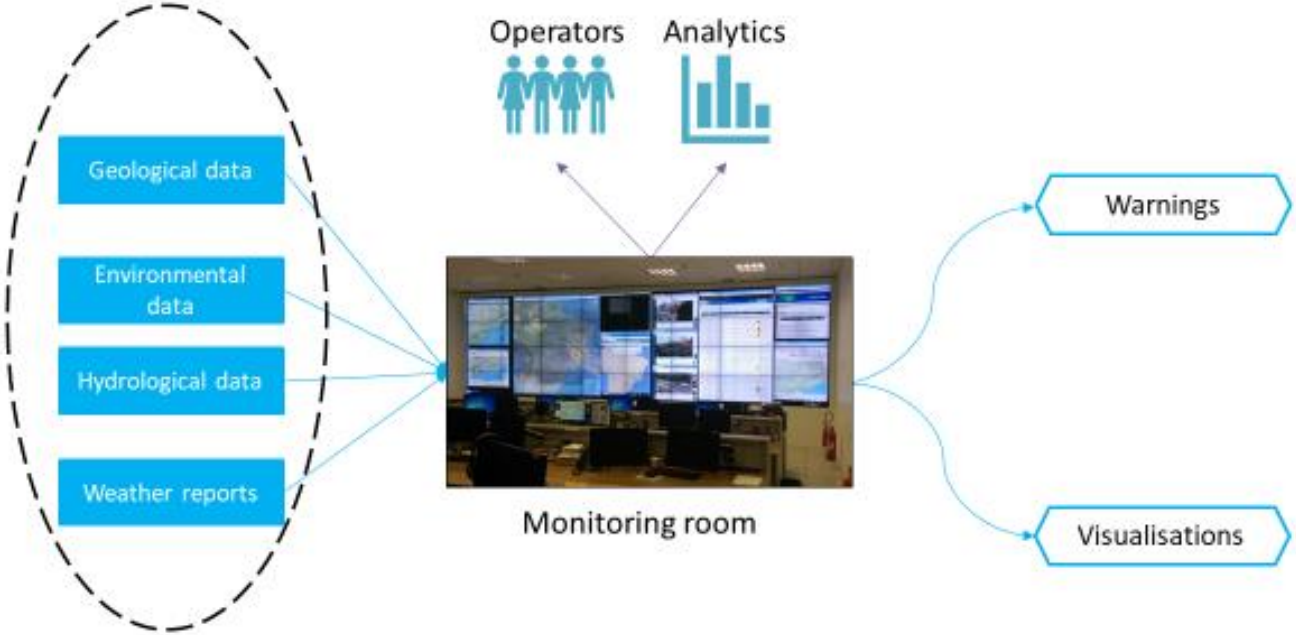
Urban Flooding in the Global South

- Developing countries are more susceptible to urban flooding.
- 14/20 megacities worldwide are located in the Global south.
- Precarious urban settlements and unregulated urban expansion is increasing exposure to urban flooding.
- Extreme weather and poor critical infrastructure resilience increase flood risk.

Flood risk management

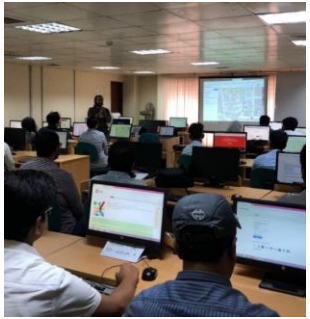
Traditional flood risk management	Alternative flood risk management
Centres of expertise	Community engagement
Hydrological/meteorological/geological data (etc)	Citizen generated data
Traditional sectoral methods	Participatory methods
Top-down organisation	Bottom-up organisation
Flood response	Innovation and adaptability
Sectoral organisation	Area/place focus

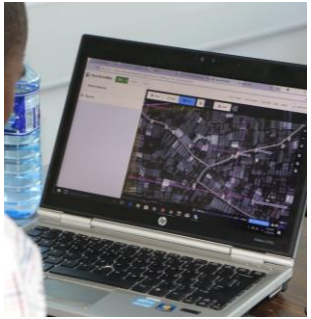
Traditional flood risk management

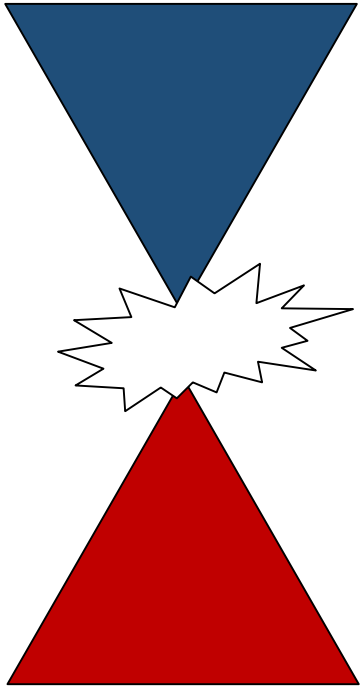


Alternative flood risk management

- Citizen participation
- Participatory mapping
- Citizen generated data
- Crowdsourcing







Instrumentality

Empowerment

The Waterproofing Data project

Waterproofing Data

Engaging stakeholders in sustainable flood risk governance for urban resilience

(October/2018- September/2021)

Challenge

How to **rethink** flood data production and flow to enable **transformations** to build sustainable, flood resilient communities?

Project Partners:

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FGV EAESP ESCOLA DE ADMINISTRAÇÃO DE EMPRESAS DE SÃO PAULO

UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386

Co-operation Partners:

Cemaden Centro Nacional de Monitoramento e Alertas de Desastres Naturais

PREFEITURA DE SÃO PAULO INOVAÇÃO E TECNOLOGIA

sema Secretaria de Estado de Meio Ambiente do Acre

Advisory Board:

British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL

CPRM Serviço Geológico do Brasil

Environment Agency

Funding Agen

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

FAPESP SÃO PAULO RESEARCH FOUNDATION

Federal Ministry of Education and Research

In coordination with:

Transformations to Sustainability

International Science Council The global voice for science

BELMONT FORUM

NORFACE ERA-NET

Waterproofing Data

Engaging stakeholders in sustainable flood risk governance for urban resilience

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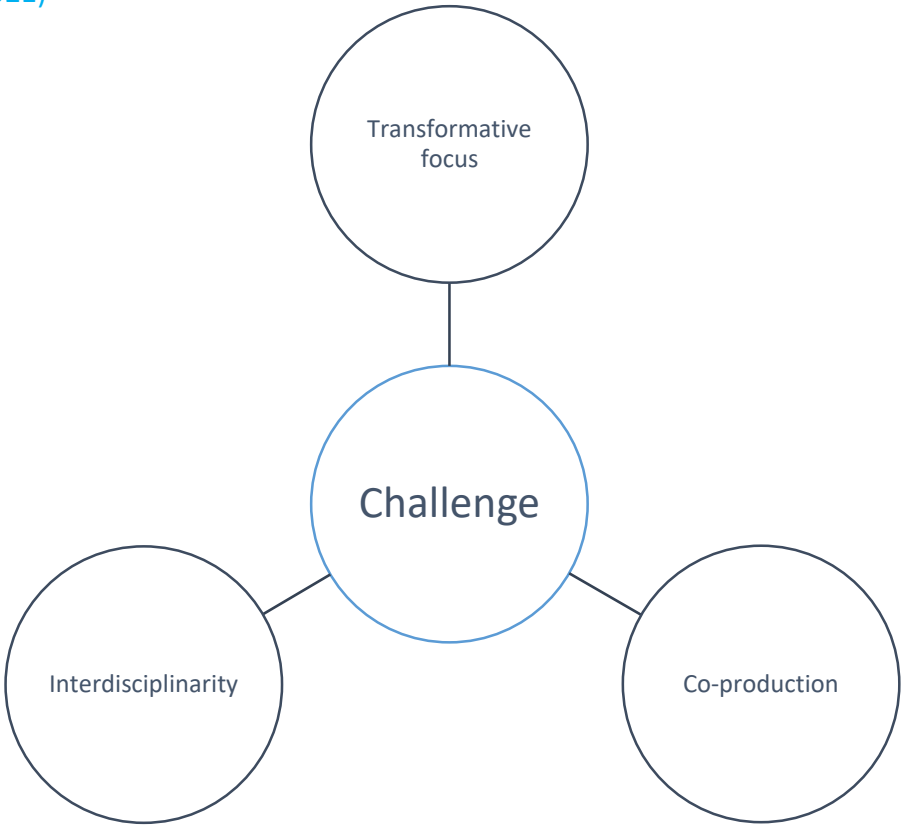

Waterproofing Data

Engaging stakeholders in sustainable flood risk governance for urban resilience

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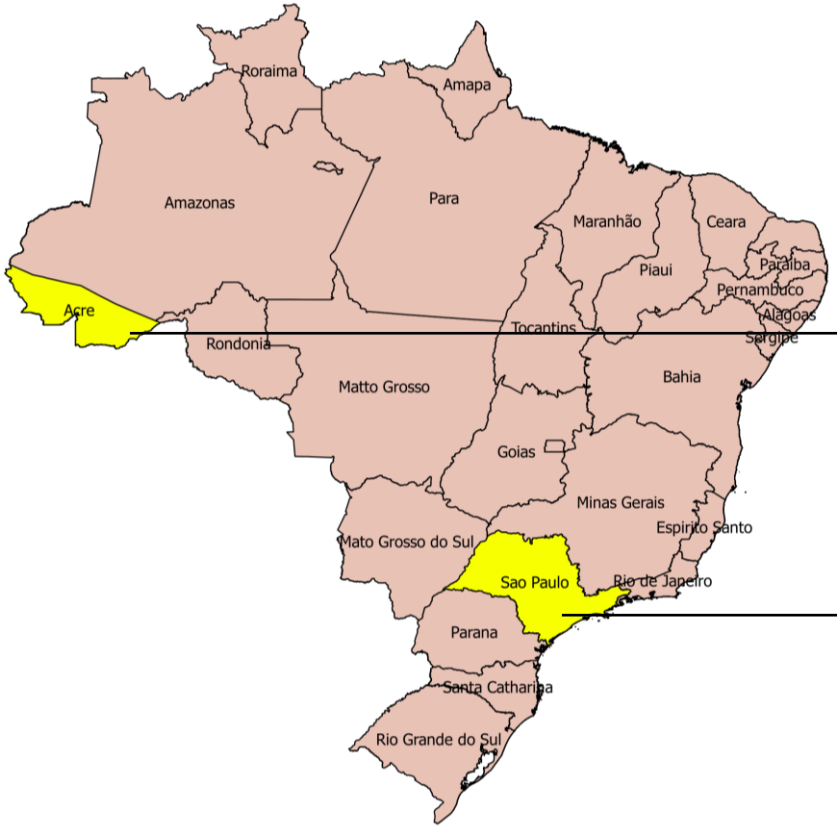

Case studies (Brazil)

Rio Branco, State of Acre
Population: 320K

São Paulo, State of São Paulo
Population: 12m

Urban flooding and landslides in Brazil

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- 1,500 death or missing in 2011 because of floods and land slides in Brazil
- 7.5 billion dollars economic impact was caused in the last 10 years due to natural disasters in Brazil
- Approximately 1,000 Brazilian municipalities have 43,000 risk-prone areas with vulnerable settlements to landslides and floods


Teresópolis/RJ, Jan 2011


Rio Branco/AC, Feb 2012


Angra dos Reis/RJ, 2009-2010


São Luís do Paraitinga/SP, Jan 2010


Divinópolis/MG, Jan 2011

Conceptual approach and implementation

Conceptual approach

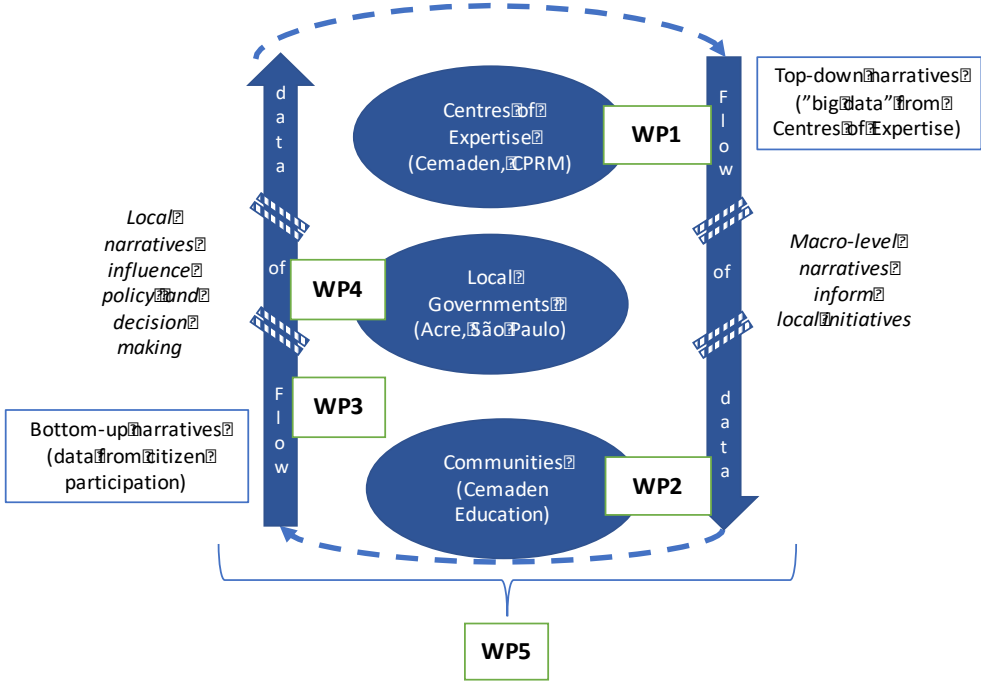

Figure 1. Scales and work packages of the project

Making Data Flows visible (2/2)

Data Diaries method

- Qualitative ethnographic analysis method.
- Involves observations of different data practices taking place in the situation rooms.
- Seeks to understand which data is used by different decision-makers in different situations.
- Will result in a data inventory and a data log.
- Will **make visible** the existing data practices used within the context of monitoring and responding to flooding events.

Community engagement through data circulation (1/4)

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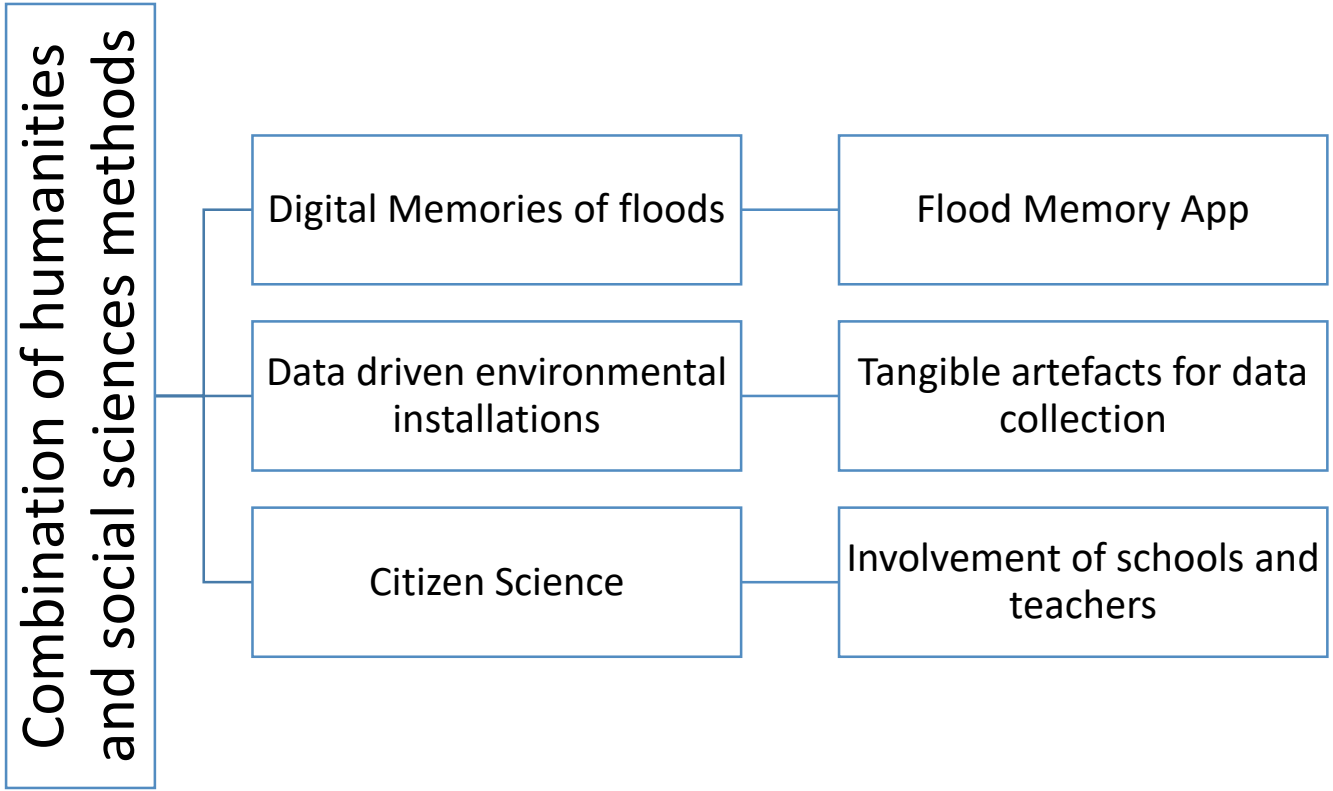


Community engagement through data circulation (2/4)

Digital memories of floods

- Capture the memories of floods from local citizen.
- Memories will be documented and archived in a digital repository.
- Attempt to unveil collective knowledge and personal mediations and anecdotes of flooding and flood risk.
- **Tacit knowledge is a form of data to be used for enhancing flood resilience.**

Community engagement through data circulation (3/4)

Data driven environmental installations

- The outcome of the combination of data from flood memory app and pre-existing flood data.
- Installations aim at mobilising and sensitising wider communities.
- Include development of data collection and communication of flood risk.
- Their ultimate goal is to **transform flood perception** and **enhance flood resilience.**

Community engagement through data circulation (4/4)

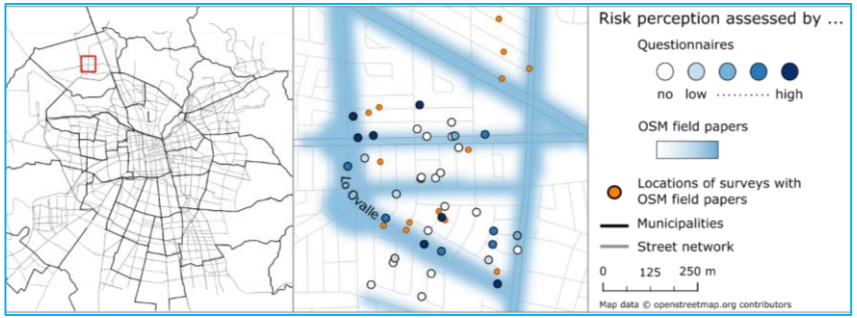
Citizen Science

- Flood-vulnerable school communities monitoring urban flooding.
- Follow up on the successful Cemaden Education project.
- Teach students to collect and monitor flood related data and inform flood prediction and management in their areas.

Integration and curation for decision support (1/2)

Participatory mapping (using OpenStreetMaps)

- Involve the community in flood-related data collection process.
- Use of **participatory mapping activities** in local .
- Local community members learn how to map flood risk around their schools.
- Building of **community resilience** and **capturing of risk perception.**
- Sketch maps and questionnaires will be used.



Integration and curation for decision support (2/2)

Participatory software design

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- Development of **a geo-computational method to integrate heterogeneous flood-related data.**
- Development of data visualization interfaces and data platform to integrate the data from previous activities.
- Use the community for the co-production of software to capture local flood risk perception.

Transformations towards waterproofing data

Co-production of local governance arrangements in transformation workshops

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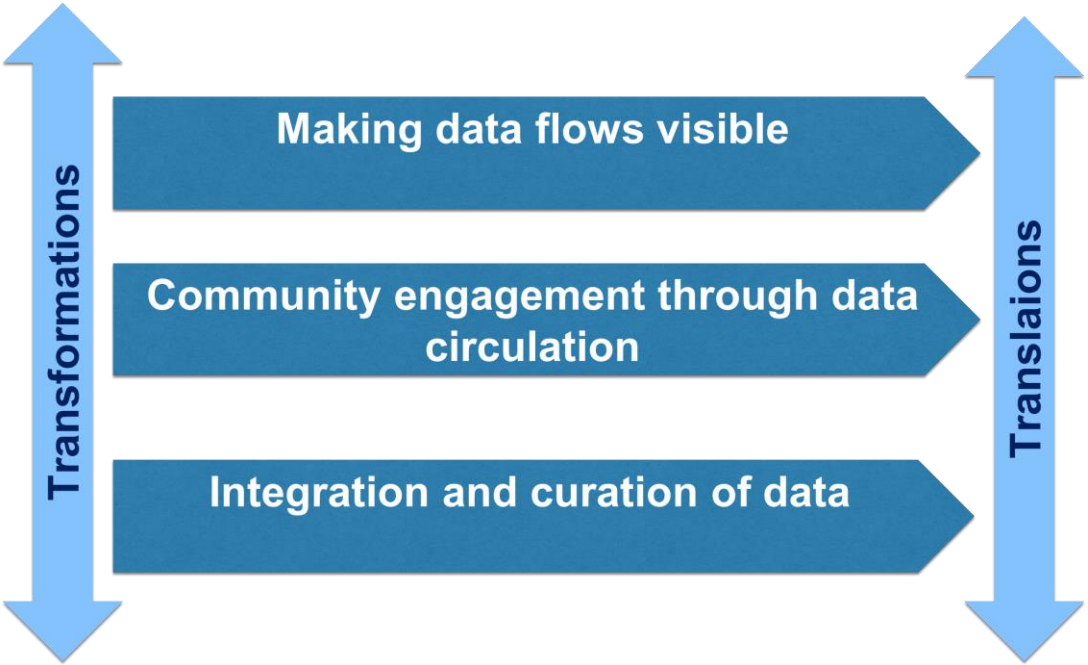
- Ensure research is incorporated into transformations of data practices.
- Three workshops will be organised.
- Participants from all data collection activities will collaborate with decision makes and data practitioners.
- How research findings can inform existing flood data practices in each organisation.

Translation of waterproof data into sustainable flood risk governance

Tracking governances changes and trans-cultural dialogues



Rethinking data, flood risk and resilience

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Epistemological approach

Scientists ➡ project leaders
Citizens ➡ data generators

Authoritative relationship between researchers and citizens

Critically Pedagogical

Scientists + Citizens
⇕
Equal Co-producers of data and methods

Dialogical relationship between researchers and citizens

de Albuquerque, J. P. de & de Almeida, A. A., (forthcoming). Modes of engagement: reframing 'sensing' and data generation in citizen science for empowering relationships. In: Mah, A. and Davies, T. (forthcoming), Toxic Truths: Environmental Justice and Citizen Science in a Post Truth Age. Manchester, UK: Manchester University Press

Take home messages

- Urban flooding is threatening contemporary cities.
- There is a need for better prediction, forecasting and response towards floods.
- There are more than the traditional approaches to flood risk management.
- Involving the community is a good way for ‘responsibiling’ individuals in flood risk response.
- Building flood resilience pivotal in preparing and confronting urban floods.

Thank you very much for your attention