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Big Data for flood management: Realising the benefits for developing countries

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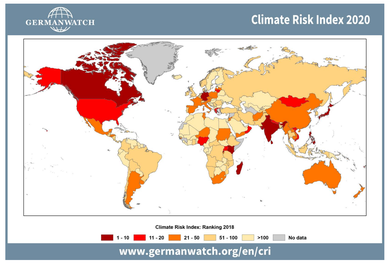
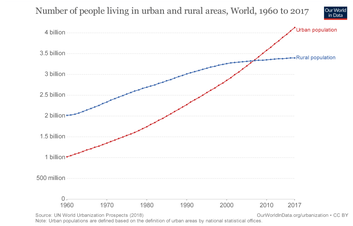
Background

With the changing climate and rapid level of urbanization, flooding has become one of the most serious challenges in front of developing nations. Such disasters hit hardest to the most vulnerable, such as the urban poor characterized by ***poverty, inadequate housing, lack of services and infrastructure***. The proportion of ***population growth*** and spatial expansion is very high in the ***dense, lower quality urban structures*** and are ***frequently at highest risk of flooding***. The ***use of big data*** from within these ***low quality urban settlement areas*** can be an useful step forward in generating information to have better understanding of their vulnerabilities.

Big data for resilience is an upcoming field of research which offers tremendous potential for increased spatio-temporal risk awareness (especially in the context of social resilience). This research proposes to unleash the unrealized opportunities of big data through the differential social and economic frames that can contribute towards better targeted information generation in disaster management.

The aim of the study is to make contribution to understanding of the ***potential of big data in developing particularly low income countries to empower the vulnerable population against natural hazard***.





Source: https://ourworldindata.org/urbanization

THE BIG QUESTION FOR BIG DATA AND DEVELOPMENT

Can big data source provide real time and long term information to improve emergency disaster management in urban settlements against natural hazard such as floods in developing countries?

Conceptualization

Aim and objectives

1. Existing and future potential of big data in applications of disaster management (flood hazard preparedness and response in lower quality urban settlements)

2. The added value of existing approaches and their potential for operationalization by citizens and agencies for capacity building (examples from existing case studies from literature)

3. The risks associated with use of big data and the foreseen and feasible ways or options to overcome those to benefit the most vulnerable (such as political, social, economic, ethical, legal constraints)

4.Future prospects and use of big data for new innovations to maximize impact in a developing world context (learning from existing knowledge and recommendations for future development)

The overall focus is on the developing particularly low income countries with options of drawing knowledge from different developing, good and not so good practice case studies.

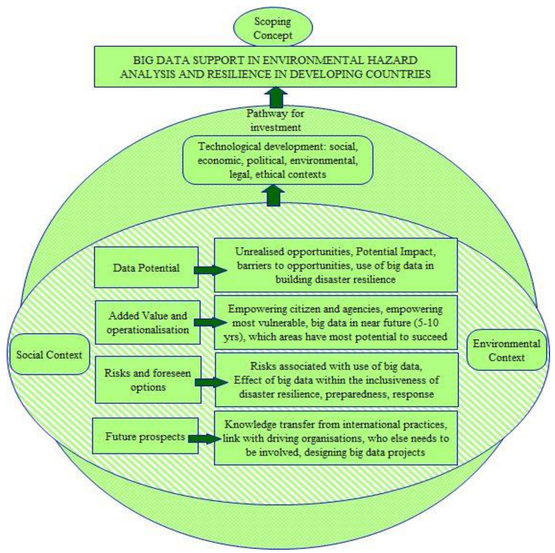


Fig.1. Scoping diagram of project

Methodology flow

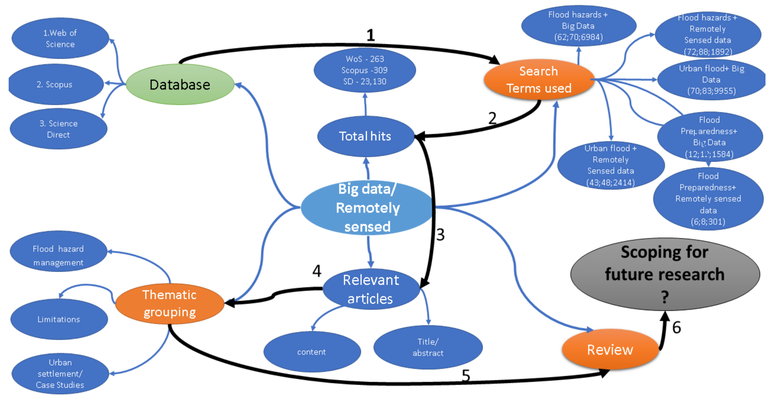
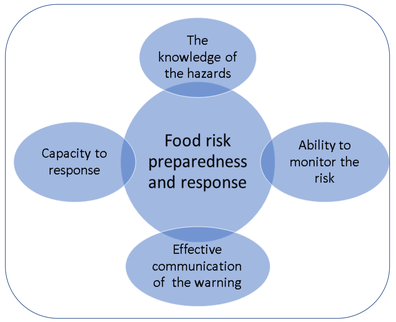


Fig 2. Big data: Research strategies

Factors influencing preparedness and response were used for more focussed investigation due to the possible gap highlighted in literature



The project undertakes a scoping research using available secondary data. Researchers have undertaken the collection of relevant literature in a structured (thematic) manner based on the proposed scoping design.

Key highlights and queries to the peers

Potential of big data in development context:

identification of flood risk and exposure have received extensive attention and majority of the literature recognised the use of remotely sensed data (RS) and GIS to map the spatial distribution of floods in an urban setting, as well as detecting temporal changes to assess risk in advance of flood events.

Big Data (RS) can improve the flood risk awareness, but for the most vulnerable groups to benefit, it requires political commitments (as informal settlements are not recognized as legitimate in most developing countries).

The capacity of informal settlement dwellers to adapt to the risk requires more than the knowledge of an imminent flood. It depends on their individual/community level coping strategy (often based on their life-long experiences), their social networks and on the available alternative support framework (provided either by the authority or NGOs).

The risk is not often relayed to the most vulnerable. Big data (RS) and its use is not mentioned in most research articles in the specific context of hazard preparedness.

Key issues for brainstorming

How to communicate to the most vulnerable groups using big data especially within the urban informal settings? Based on

a) Effective communication of the warning and
b) Enhance capacity to respond

What type of Big Data is most effective and appropriate for such communication? Based on

a) Access to data
b) Risk and ethics: security threats
c) Inclusivity: poor, uneducated
d) Governance : capacity, image accessibility, economic and political will
e) Skills

Adaptability and applicability of big data : big gap in research

The majority of literature claimed that technically high-qualitative flood predictions by themselves are not enough to attain the desired decrease in losses and impact. They gave importance to the human factor in EWS.

How to bridge the disciplinary gap?

Acknowledgement and Main References (longer list can be provided on request)

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