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# Scientific Challenges for Enhancing Urban Pluvial Flood Resilience

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## Climate Change

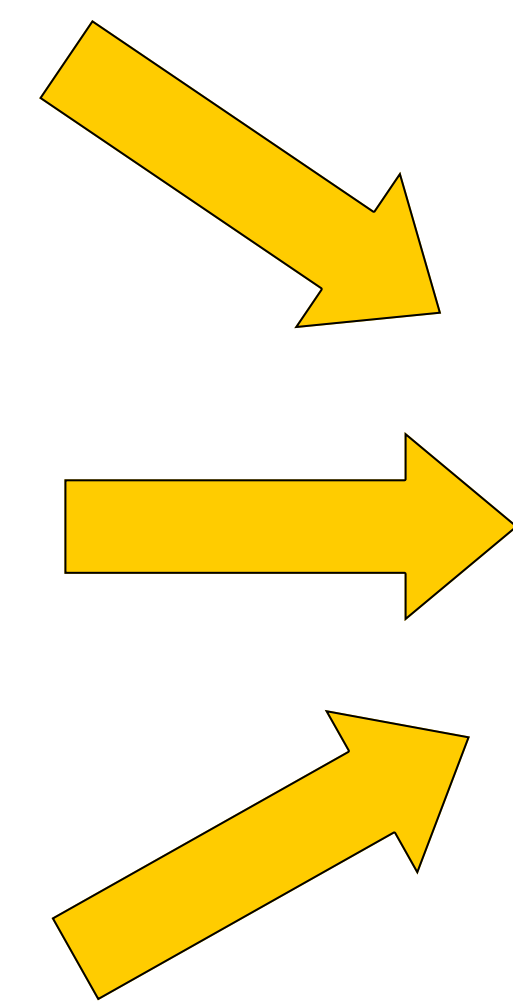
Increases frequency of extreme rainfall events

## Increased Urbanisation

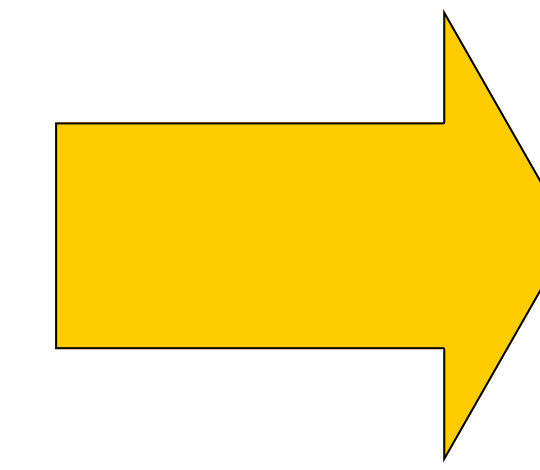
Decreases infiltration, increases runoff & exposure

## Increasing Population Density

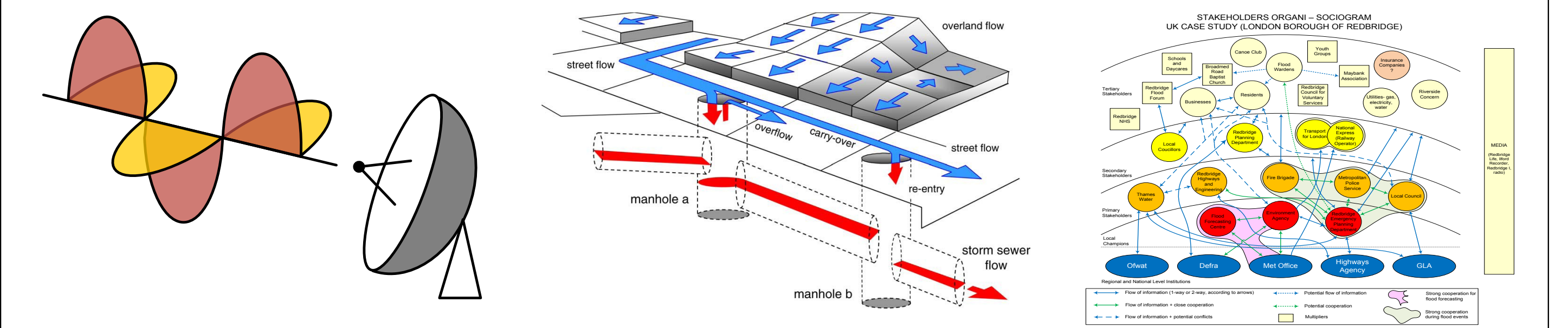
Leads to increased exposure in urban areas



**Increased Risk of Urban Pluvial Flooding**



## Need to Enhance Urban Pluvial Flood Resilience



## Requirements

## Challenges

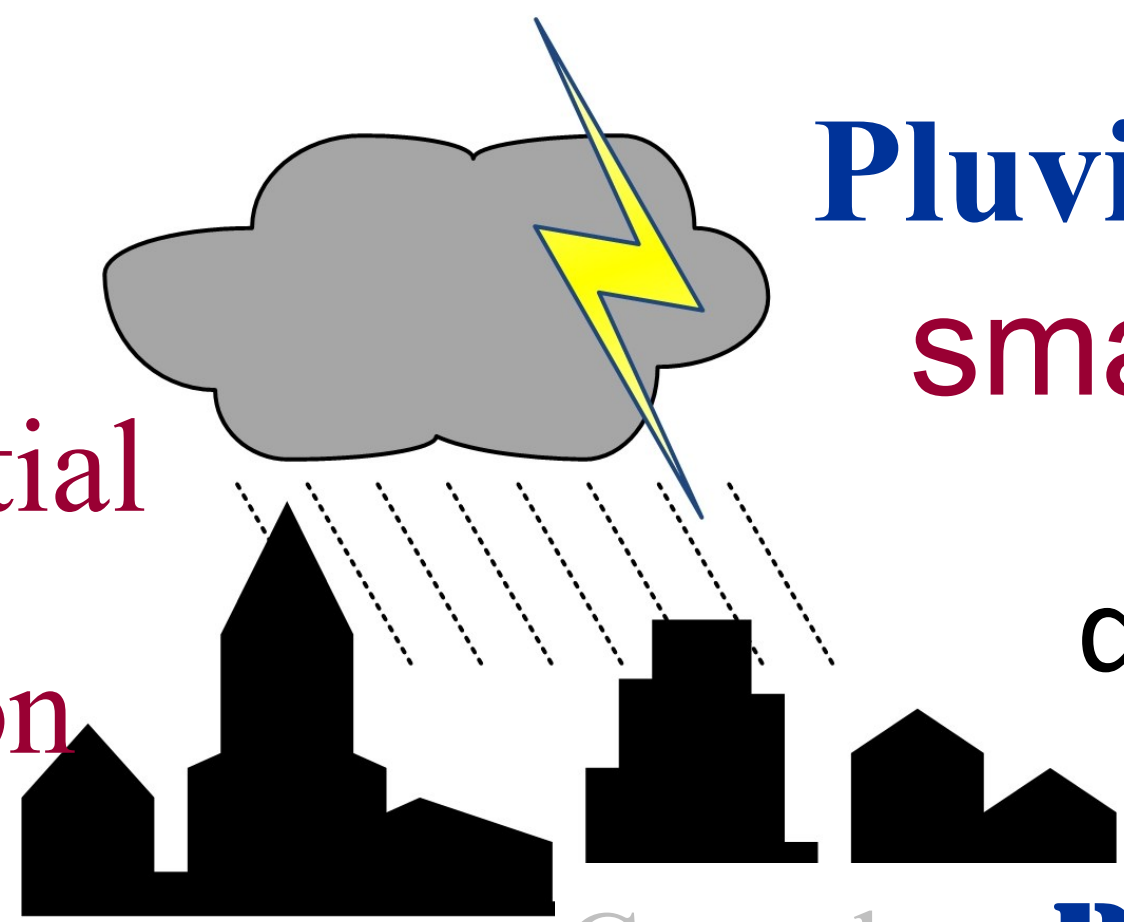
## Solutions

Rainfall Estimation & Forecast

Forecast

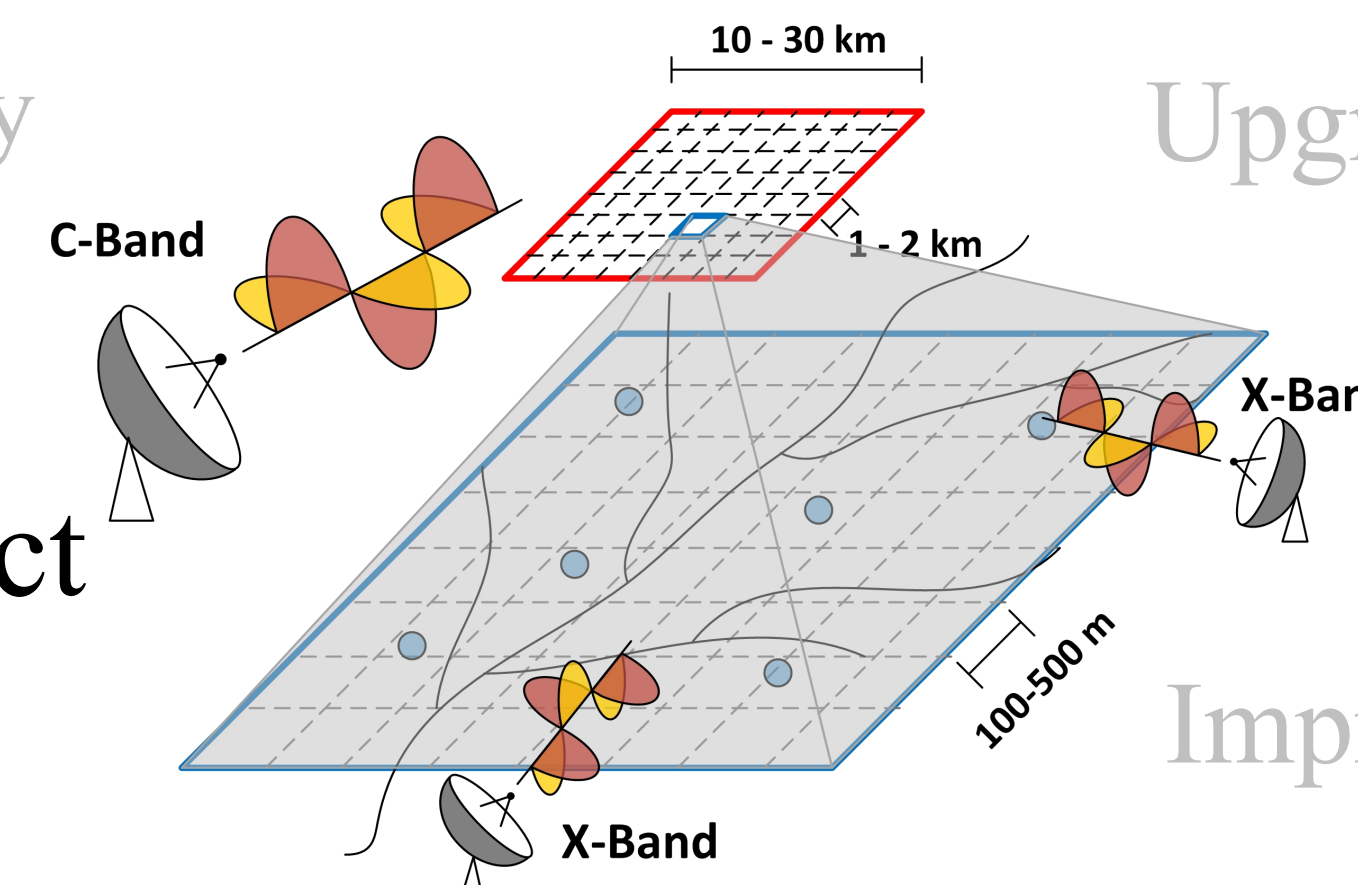
Reliable rainfall estimates

and forecasts with high spatial and temporal resolution



Pluvial flooding is often caused by small-scale thunderstorms

difficult to monitor and predict



Upgraded X-band radar network for urban areas

Advanced rainfall data merging techniques

Systematic flood event documentation

Improved understanding & modelling of

sewer-surface interactions

Hydrological & Hydraulic Modelling

Modelling

Complete urban pluvial flood records, for calibration and verification of

models & impact analysis

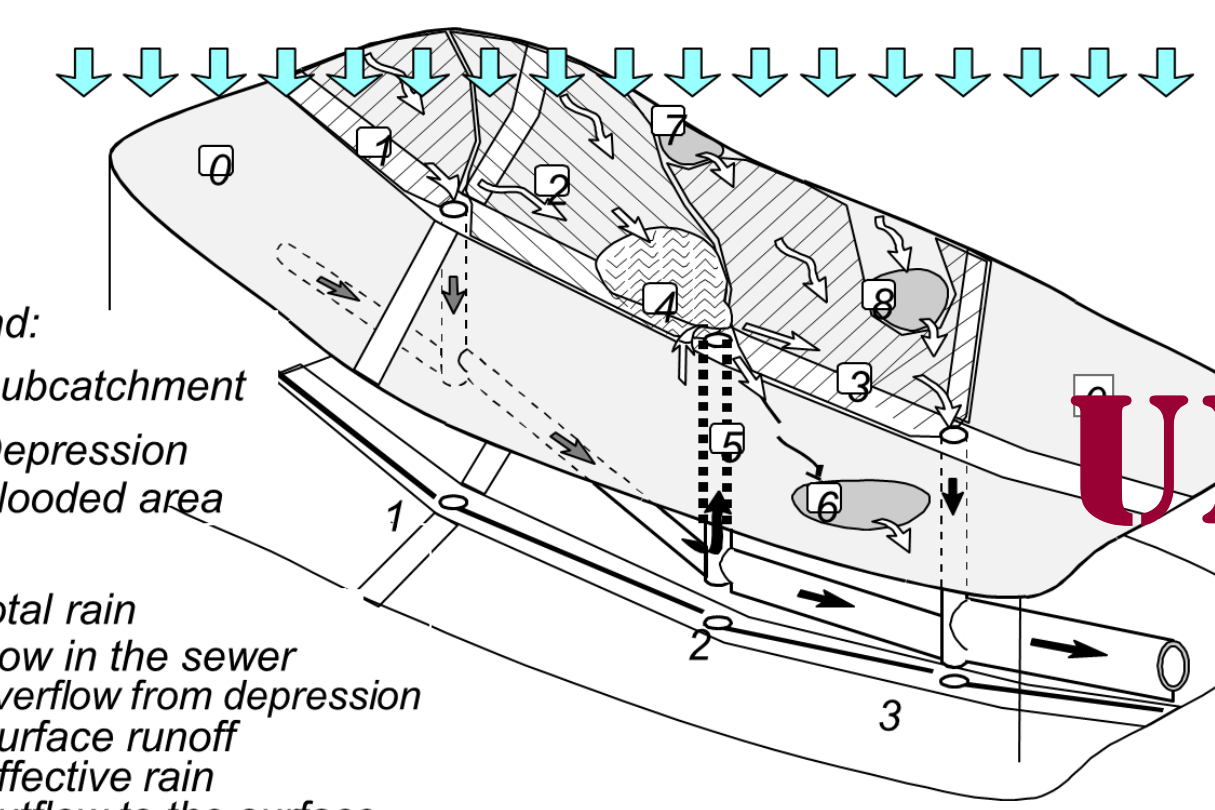
Accurate, yet fast hydrological & hydraulic models



SELDOM AVAILABLE, particularly surface flow data & flood impacts

Complexity of urban areas & interactions surface-sewers

Accuracy  $\propto (1/\text{Simulation Time})^n$



Hybrid dual-drainage models

UNCERTAINTY propagation analysis

Framework & platforms to efficiently integrate rainfall inputs with hydro models and uncertainty analysis models

Flood Risk & Emergency

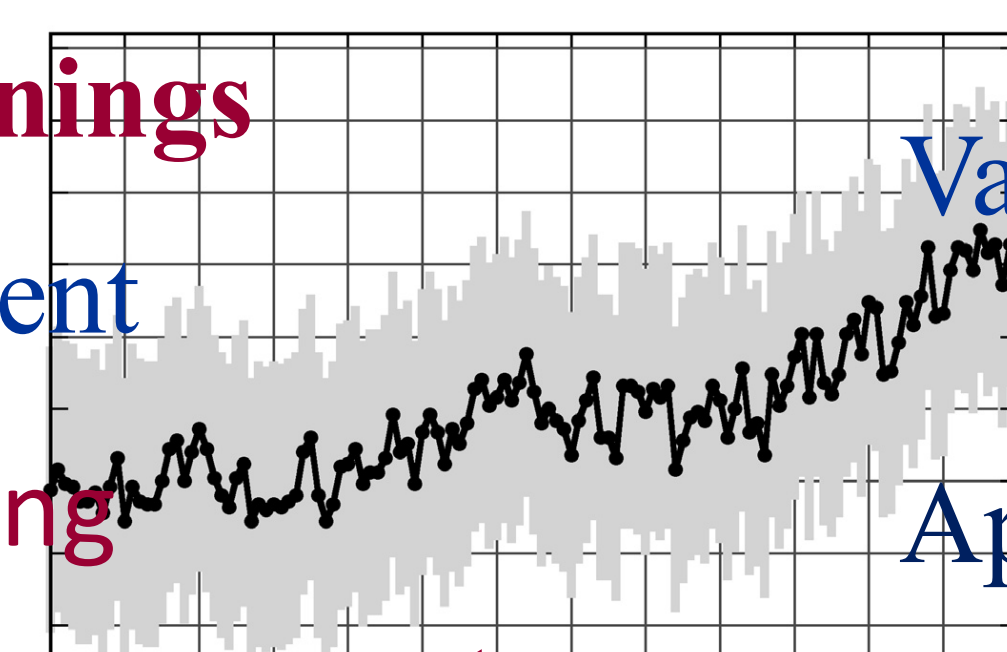
Emergency

Forecasting & early warnings

Improved emergency management

Water sensitive urban planning

Active stakeholder engagement in FRM



Various data formats, and simulation tools

Lack of coordination between flood authorities

Apathy, low flood risk awareness

Lack of information and tools to support decision making



Clear definition of roles of flood authorities

Community engagement at local level; e.g. Community Flood Plans

Information sharing at all levels

DSS Tools based on improved models and datasets