A Remote Sensing Based Integrated Approach to Quantify the Impact of Fluvial and Pluvial Flooding in an Urban Catchment

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Introduction

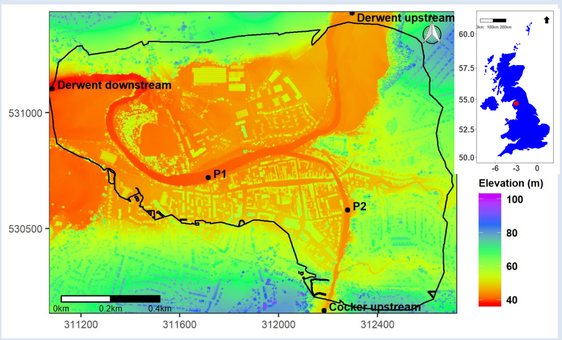
Background

- Currently, there is a lack of knowledge about the modelling and estimation of pluvial flood and its effective management and mitigation compare to fluvial flood.
- Restricted knowledge and consistent underestimation of pluvial flooding have resulted in uninformed and biased predictions of the flooding within urban environments
- Collection of high-resolution data and better integration of data from multiple sources - although challenging - play a major role in accurate modelling of pluvial flooding.
- Increased availability of various remote sensing technologies including unmanned aerial system (UAS) has made high resolution data collection less challenging.

Aim

To develop a conceptual remote sensing based integrated approach to enhance current practice in the estimation of flood extent and damage and characterise the spatial distribution of pluvial and fluvial flooding.

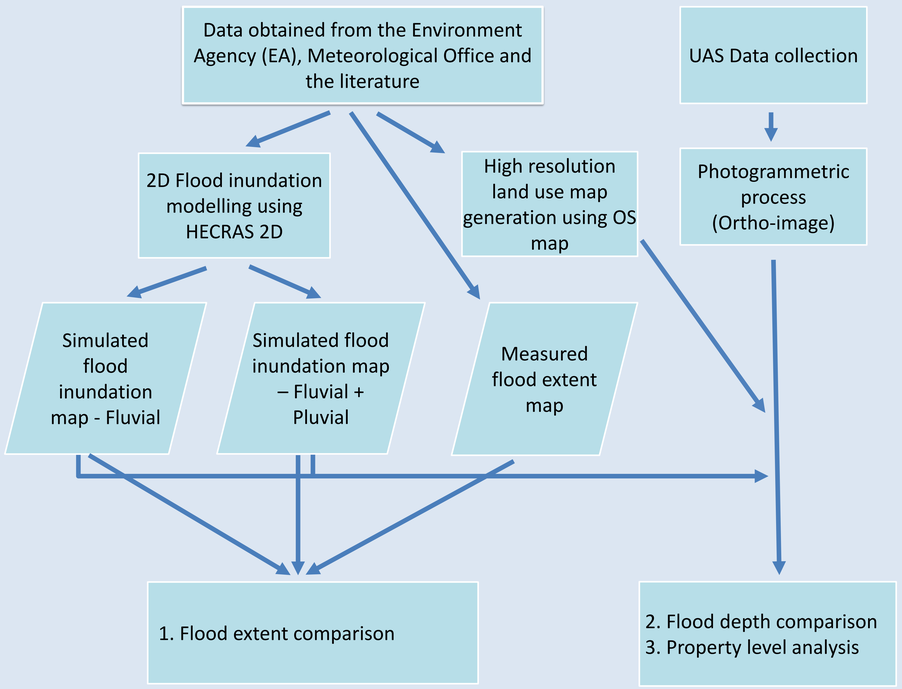
Study site



Cockermouth Town: Area – 142 ha, Population ~ 80000, households ~ 4000 (2011)

Method

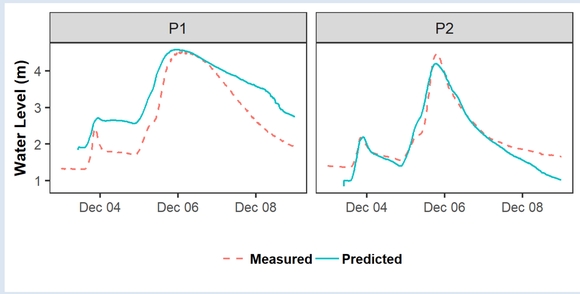
Workflow



1. Flood extent comparison

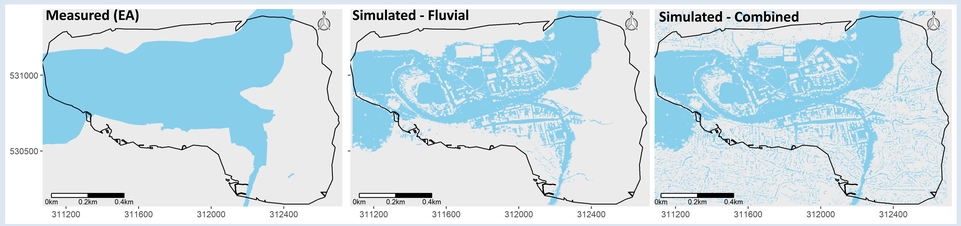
2. Flood depth comparison
3. Property level analysis

Model calibration

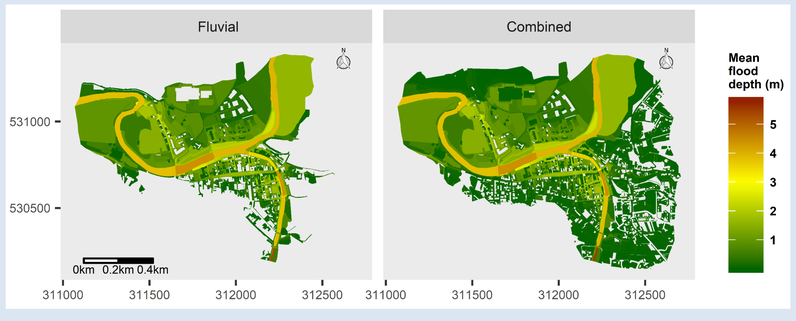


Results

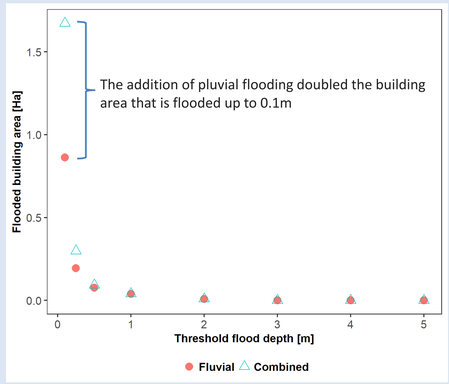
Flood extent comparison



Flood depth comparison



Property level analysis



Contribution of pluvial flooding in total flood depth	Number of properties
0 (Fluvial flooding only)	16
1% - 25%	84
26% - 50%	41
51% - 75%	11
76% - 99%	10
100% (Pluvial flooding only)	51
Total	**213**

Conclusions and remarks

Pluvial flooding can have a significant effect even in a catchment where fluvial flooding is the major cause of the flood damages.

Significant effect of pluvial flooding in flood damages shows that pluvial flooding needs to be taken into account for a comprehensive flood emergency planning

Room for improvement in the presented approach

- Representing the detailed urban drainage network in the model
- Calibrating pluvial flood extend and depth more accurately

Wider use of UAS in remote sensing data collection should be put to good use for improving the presented approach further.

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