Flood Footprint assessment

Socioeconomic assessment of flooding impact on urban areas and wider economic systems

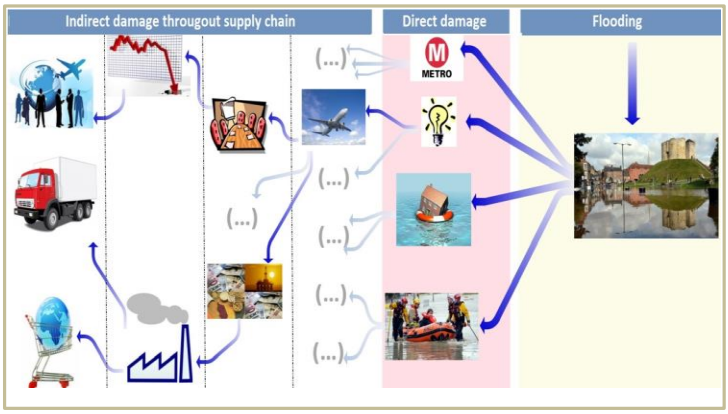
FACTSHEET

Project area: *Flood Footprint*
Intended readership: *Practitioners, academics, interest groups*

Analysis of the economy and society is central to understanding the broad impacts of flooding and to identify cost-effective adaptation and mitigation measures

Flood Footprint Research Aims

Figure 1. Direct Impact and Knock-on effects



The international headlines over the last few years have been dominated by extreme flooding or flood-related events. Assessments of the flooding impacts have traditionally focused on the initial impact on people and physical assets. These initial estimates ('direct damage') are useful both in understanding the immediate implications of damage, and in marshalling the pools of capital and supplies required for re-building after an event. Since different economies and societies are coupled, especially evident under the current economic crisis, any small-scale damage may be multiplied and cascaded throughout wider economic systems and social networks ('indirect damage'). The direct and indirect damage is currently not evaluated well and could be captured by quantification of the Flood Footprint (Figure 1). The proposed flood footprint is an entirely new concept and damage accounting framework to measure the total socioeconomic impact that is directly and indirectly caused by a flood event to the flooding region and wider economic systems and social networks.

Benefits from the Flood Footprint assessment

The Flood footprint framework could optimise the investment in flood risk management options by identifying the blind-spots in critical infrastructure and vulnerable sectors along with the economic supply chains and social networks. This would allow sufficient adaptation to the urban environment to reduce the level of damage from future events. Adaption to flood risk is not limited to the area which suffers the direct damage. It also extends to entire socioeconomic networks and this must be considered in order to minimise the magnitude and probability of cascading damage to the non-flooded regions.

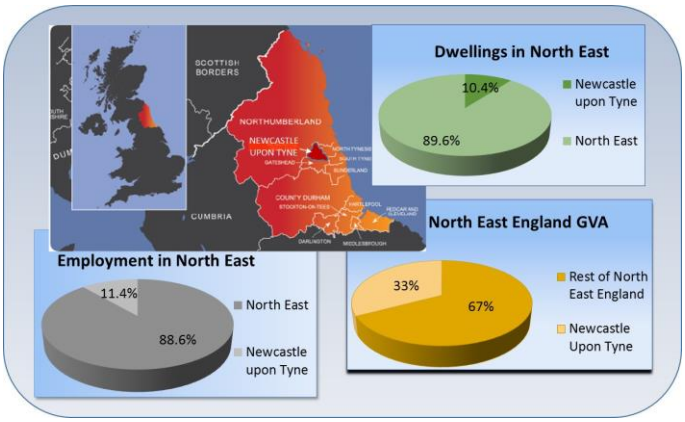


Figure 2: Scaling down the Flood Footprint model for the City of Newcastle

Modeling

The Flood Footprint model, originally developed at county level, has been statistically adapted to focus on the city of Newcastle and will be used to quantify the cost-benefit of Blue-Green adaptation measures, and further impacts to the national economy (Figure 2). The process consist of two stages: data collection and codification, and modelling design.

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Data collection and codification

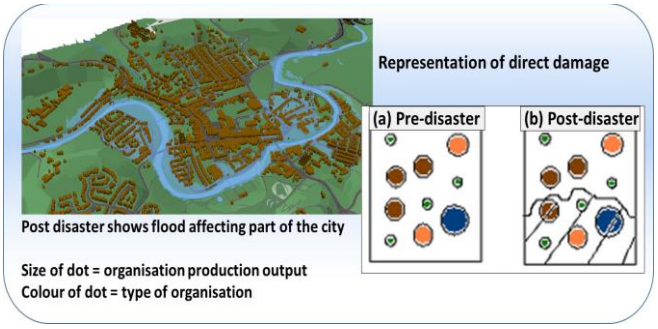

Figure 3. Direct damage representation from flood modeling and damage functions

Two sets of information are needed. The first set includes the information of the natural hazard (e.g. intensity and length) and the affectation to the regional economy (i.e. damage to capital assets, equipment, households, public services, etc.).

This information is translated as the productivity reduction in the affected economy, which constitutes the starting point from where the economy starts the recovery process.

The second set of information is related to the regional economy, which provides the context in which the economy's imbalances and restoration process interact during recovery. This information mainly comprises the Input Output tables, which is a compendium of all inter-sectoral transactions in the economy as well as the interaction with other regions.

All the information must be properly arranged for the Flood Footprint model and the information of the damages must be translated into productive capacity reduction (Figure 3).

Modelling design

The developed model is capable of assessing the impact of flooding on regional economy, accounting for interactions between industries through demand and supply of intermediate consumption goods with a circular flow – a set of inputs which should match, given certain restrictions, with a set of outputs that subsequently becomes a set of inputs in the next round. This process continues during recovery towards resumed production level at pre-disaster condition. Figure 4 presents the work flow (modelling processes) of our estimated total economic impact, i.e. the flood footprint.

Expected results

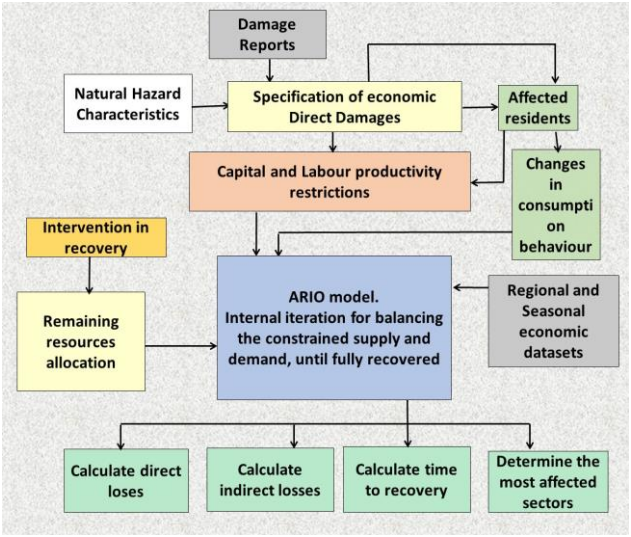

Figure 4. Flood Footprint modeling flow chart

Four major results can be obtained, as shown in the green boxes at the bottom of Figure 4:

• Direct economic loss (by sector and by region) computed as a proportion of industrial capital damage relative to total capital stock.

• Indirect economic loss (by sector and by region) computed as the accumulation of differences between recovered production capacity and pre-disaster condition at each time-point.

(Total Flood Footprint is the sum of direct and indirect economic loss until the economy is fully recovered).

•Time it takes to fully recover.

•Results can be illustrated by sectors and regions.

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